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# MONTANA HISTORICAL ENERGY STATISTICS

Prepared by

Rick Itami

Montana Energy Office

February 1978

TABLE OF CONTENTS


| | | Page |
|---|---|---|
| | Table of Tables | ii |
| | Table of Figures | iv |
| | Foreword | v |
| I. | Energy Production and Consumption | 1 |
| II. | Electricity | 7 |
| III. | Coal | 20 |
| IV. | Natural Gas | 31 |
| V. | Crude Petroleum and Petroleum Products | 46 |
| VI. | Uranium | 63 |
| VII. | Renewable Energy Projects | 67 |
| | Appendix | 79 |
| | References | 84 |

TABLE OF TABLES


| Table | | Page |
|---|---|---|
| 2.1 | Electric Generating Capacity in Montana | 8 |
| 2.2 | Annual Generation of Electricity in Montana | 9 |
| 2.3 | Monthly Sales of Electricity in Montana by Electric Utilities | 11 |
| 2.4 | Annual Sales of Electricity by the Electric Utility Industry in Montana | 15 |
| 2.5 | Average Annual Prices for Electricity Sold in Montana | 16 |
| 2.6 | Consumption of Fuels by Electric Utilities in Montana | 17 |
| 2.7 | Industrial Consumption of Electricity in Montana in 1975 and 1976 | 19 |
| 3.1 | Total Estimated Remaining Identified Resources of Coal and Lignite | 21 |
| 3.2 | Montana Coal Production, By Mine, By Mouth, 1977 | 22 |
| 3.3 | Montana Coal Production, By County. | 23 |
| 3.4 | Montana Coal Production and Average Minemouth Prices by Type of Coal | 25 |
| 3.5 | Summary of Coal Receipts from Montana and Wyoming by Electric Utility Plants. | 26 |
| 3.6 | Average Minemouth Coal Prices in Montana, by County | 27 |
| 3.7 | Distribution of Coal Produced in Montana, Wyoming, and North Dakota in 1975 and 1976, by State of Destination. | 29 |
| 3.8 | Distribution of Coal in Montana | 30 |
| 4.1 | Natural Gas Proved Reserves in Montana 1950-1976. | 32 |
| 4.2 | Production, Average Wellhead Prices and Distribution of Natural Gas in Montana. | 33 |
| 4.3 | Sales and Average Prices of Natural Gas in Montana. | 36 |
| 4.4 | Sales of Natural Gas in Montana by Gas Utilities. | 37 |
| 4.5 | Average Annual Natural Gas Prices | 39 |
| 4.6 | Natural Gas Production and Consumption in Montana | 40 |
| 4.7 | Capacity and Production of Natural Gas Processing Plants in Montana | 41 |
| 4.8 | Montana Imports and Exports of Natural Gas. | 42 |
| 4.9 | Consumption of Natural Gas by Mining and Manufacturing in Montana in 1976 | 45 |
| 5.1 | Crude Oil Proved Reserves in the United States and Montana 1950-1976 | 47 |
| 5.2 | Estimate of Montana Crude Oil Proved Reserves, by Region, January 1, 1977 | 48 |
| 5.3 | Crude Oil Production (1000 barrels) and Average Wellhead Prices | 49 |

TABLE OF TABLES CONTINUED


| Table | | Page |
|---|---|---|
| 5.4 | Crude Oil Refined in Montana Refineries by Source of Crude | 51 |
| 5.5 | Total Crude Oil Refined in Montana by Source | 55 |
| 5.6 | Consumption of Motor Fuels in Montana | 56 |
| 5.7 | Production and Consumption of Gasoline in Montana | 57 |
| 5.8 | Sales of Petroleum Products in Montana | 58 |
| 5.9 | Sales of Residual Fuel Oil in Montana by Sector | 59 |
| 5.10 | Sales of Distillate Fuel Oil in Montana by Sector | 60 |
| 5.11 | Sales of LPG in Montana by Sector | 61 |
| 5.12 | Distribution of Montana Crude Oil Exports by State of Destination | 62 |
| 6.1 | Estimated Uranium Ore Reserves by States, January 1, 1975 | 64 |
| 6.2 | Existing Uranium Leases on State Land in Montana as of November 1, 1977 | 65 |
| 6.3 | Active Uranium Prospecting Permits in Montana, as of June 1, 1977 | 66 |

TABLE OF FIGURES


| Figure | | Page |
|---|---|---|
| 1.1 | Production of Energy in Montana in 1976 | 2 |
| 1.2 | Consumption of Energy in Montana in 1976. | 2 |
| 1.3 | Production and Consumption of Energy in Montana. | 3 |
| 1.4 | Consumption of Energy in Montana, By Sector | 4 |
| 1.5 | Consumption of Energy in Montana, By Type of Fuel | 4 |
| 1.6 | Production of Energy in Montana, By Type of Fuel | 5 |
| 1.7 | Production, Consumption, Imports and Exports of Fossil Fuels in Montana in 1976 | 6 |
| 2.1 | Annual Generation of Electricity in Montana, 1950-1976. | 10 |
| 2.2 | Annual Sales of Electricity in Montana, 1950-1976 | 10 |
| 2.3 | Annual Generation and Sales of Electricity in Montana, 1950-1976. | 14 |
| 4.1 | Supply of Natural Gas in Montana, 1976. | 34 |
| 4.2 | Sales of Natural Gas in Montana, by Consuming Sector. | 35 |
| 4.3 | Supply of Natural Gas in Montana, by Source Region, 1954-1976 | 43 |
| 4.4 | Montana Natural Gas Production and Exports. | 44 |
| 5.1 | Supply of Crude Oil in Montana in 1976. | 50 |
| 5.2 | Petroleum Refined in Montana, by Source of Crude. | 54 |

# FOREWORD

This document is primarily an updated version of Montana Historical Energy Statistics, prepared by Terry Wheeling in September of 1976. The Montana Energy Office intends to perform a yearly update of this publication henceforth.

The main differences in this version from the earlier one are that tables of strictly United States data have been eliminated and the narrative has been limited to one page of highlights for each section.

As before, differences in similar types of data occur among reports from various agencies. The reason for this is the difference in data collection and reporting procedures. The Appendix contains explanations of the various data tables.

# I

# ENERGY PRODUCTION AND CONSUMPTION

## HIGHLIGHTS

- Total energy production in Montana reached 760 trillion British thermal units in 1976 -- an increase of 17 percent from 1975.

- Of the total energy produced in Montana, coal accounted for 62 percent, crude oil 24 percent, natural gas 7 percent and hydroelectric 7 percent.

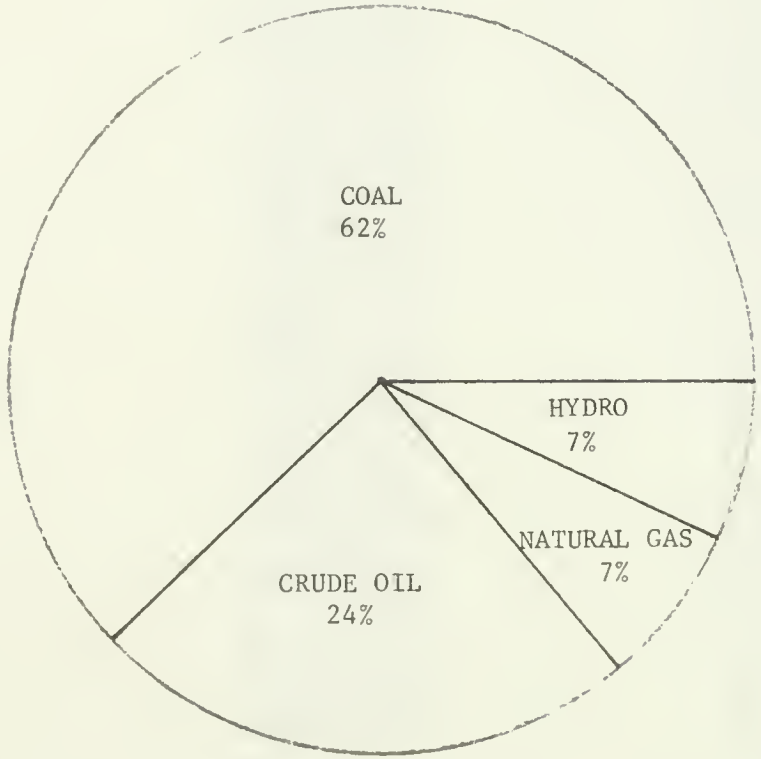
- Energy consumption in Montana totaled 278 trillion British thermal units in 1976, which amounts to a 3.0 percent increase from the previous year.*

- Consumption of petroleum products accounted for 48 percent of the total, natural gas 28 percent, coal 15 percent, and hydroelectric power 9 percent.

- The industrial sector consumed 43 percent of the energy in 1976, the residential/commercial sector 25 percent, and the transportation sector 32 percent.

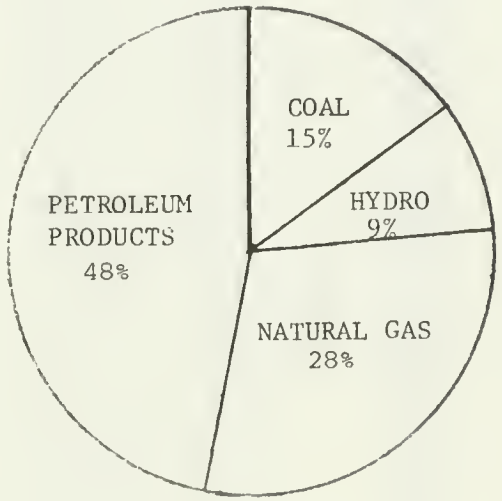
* The comparison between the 1975 and 1976 total energy consumption is not an exact one because the method of arriving at consumption of natural gas differs between 1976 and previous years. In the years preceding 1976, the "company use" portion of natural gas consumption was estimated as an additional 5 percent. In 1976, the actual "company use" figures were obtained from the utilities, which resulted in a figure less than 5 percent.

Figure 1.1




PRODUCTION
(760 TBTU)

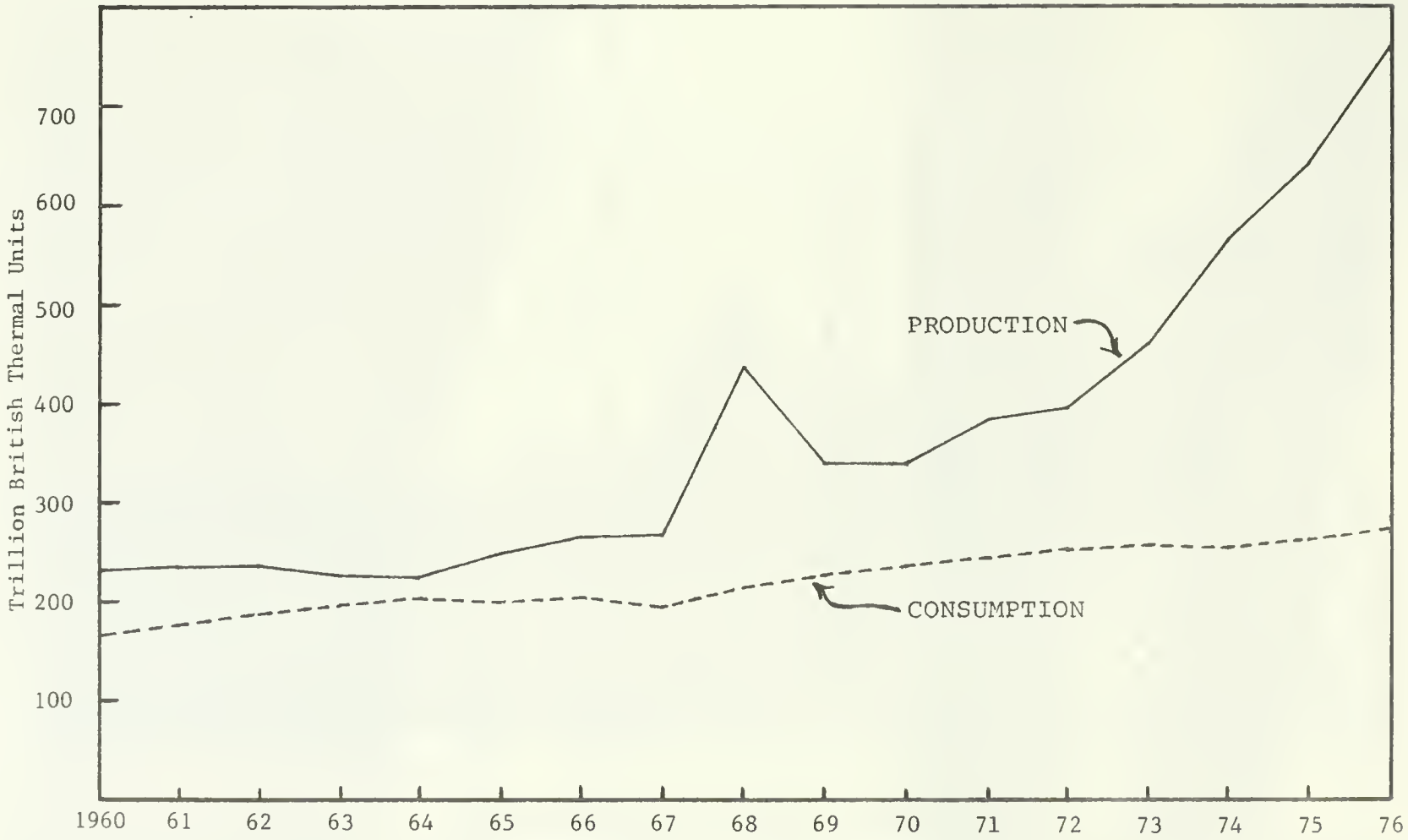
Figure 1.2




CONSUMPTION
(278 TBTU)

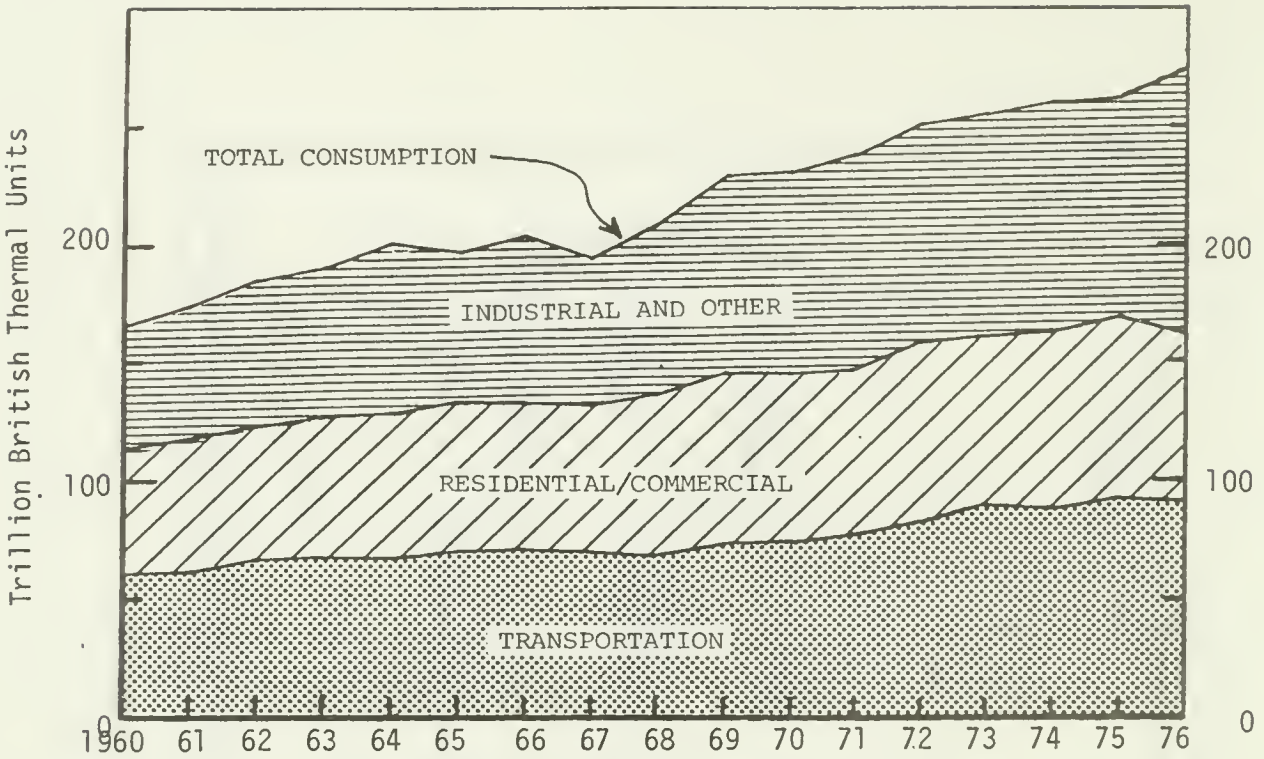
Production and Consumption of Energy in Montana in 1976
(In Trillion British Thermal Units)

Figure 1.3



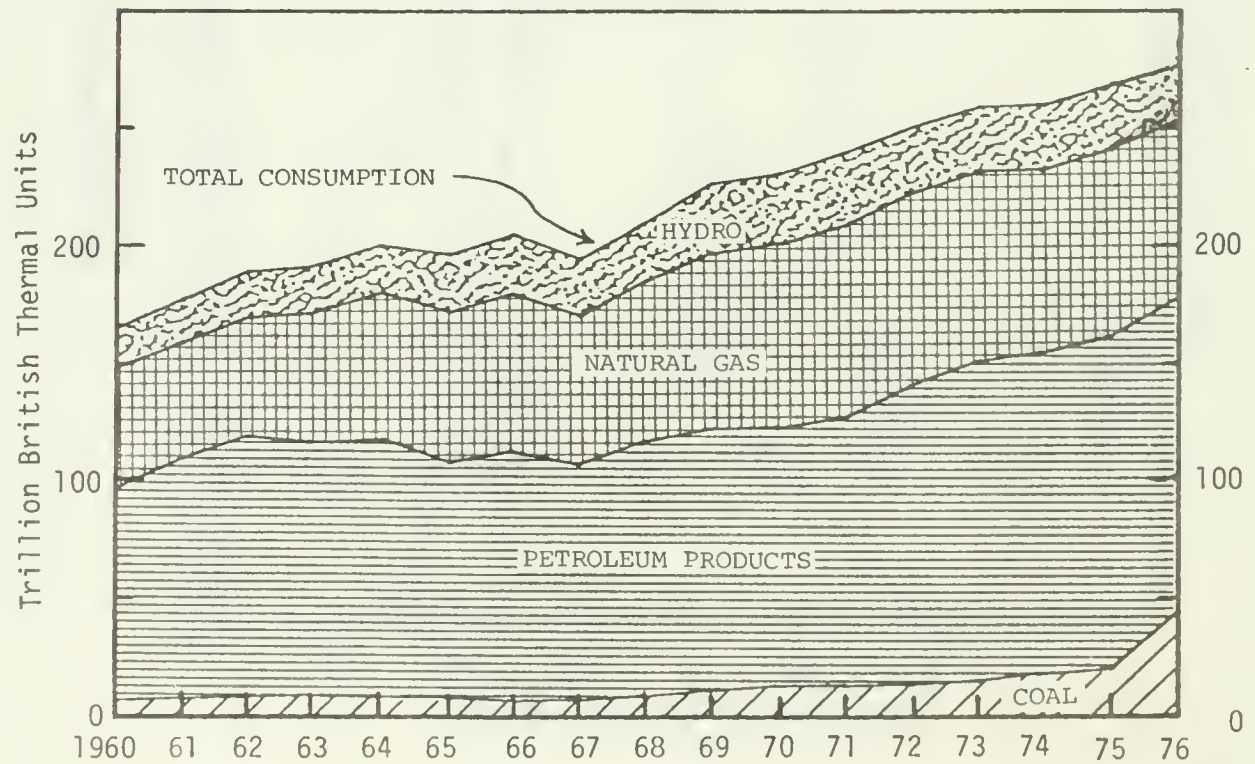

Production and Consumption of Energy In Montana
(In Trillion British Thermal Units)

Figure 1.4



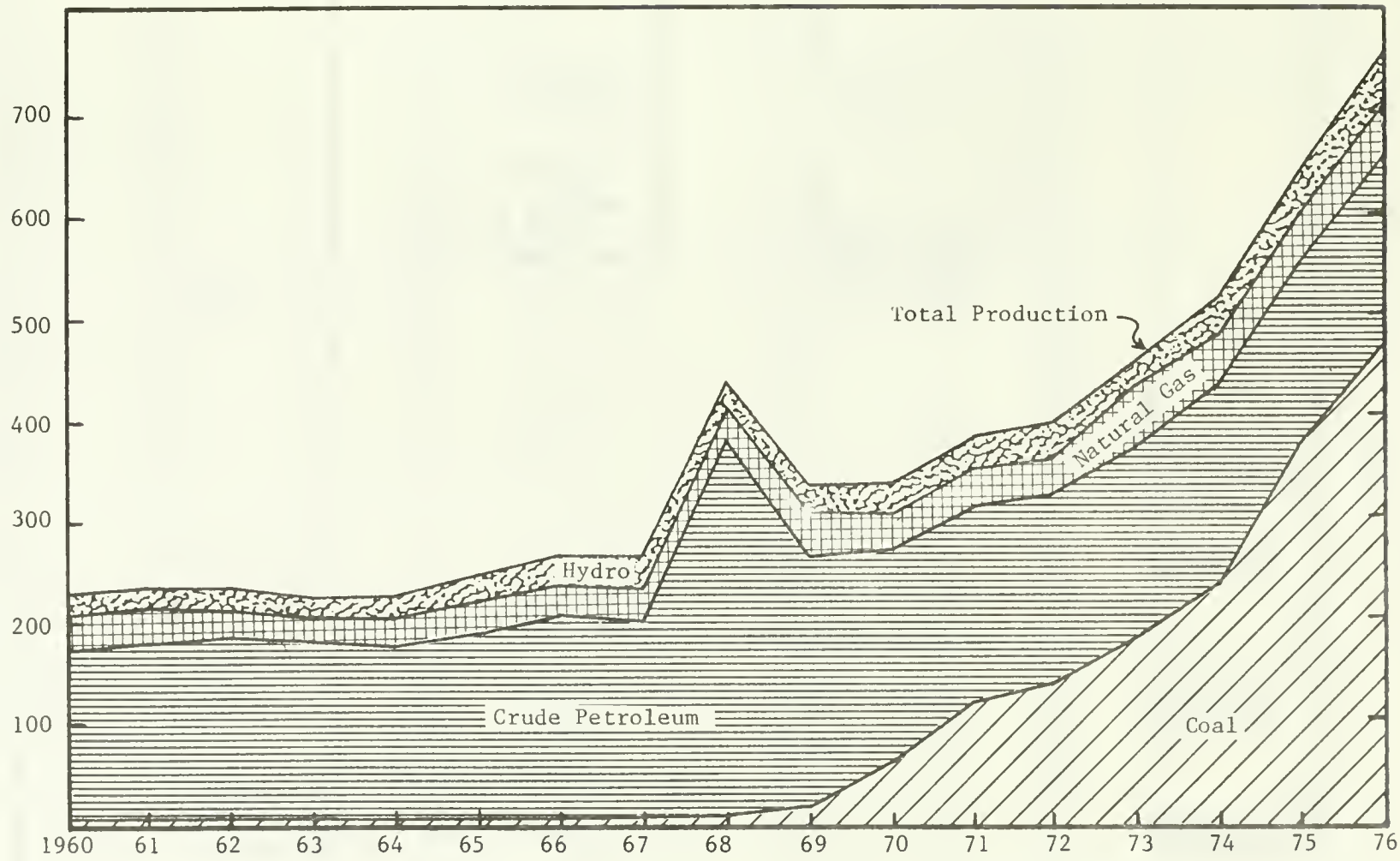

Consumption of Energy In Montana, By Sector
(In Trillion British Thermal Units)

Figure 1.5



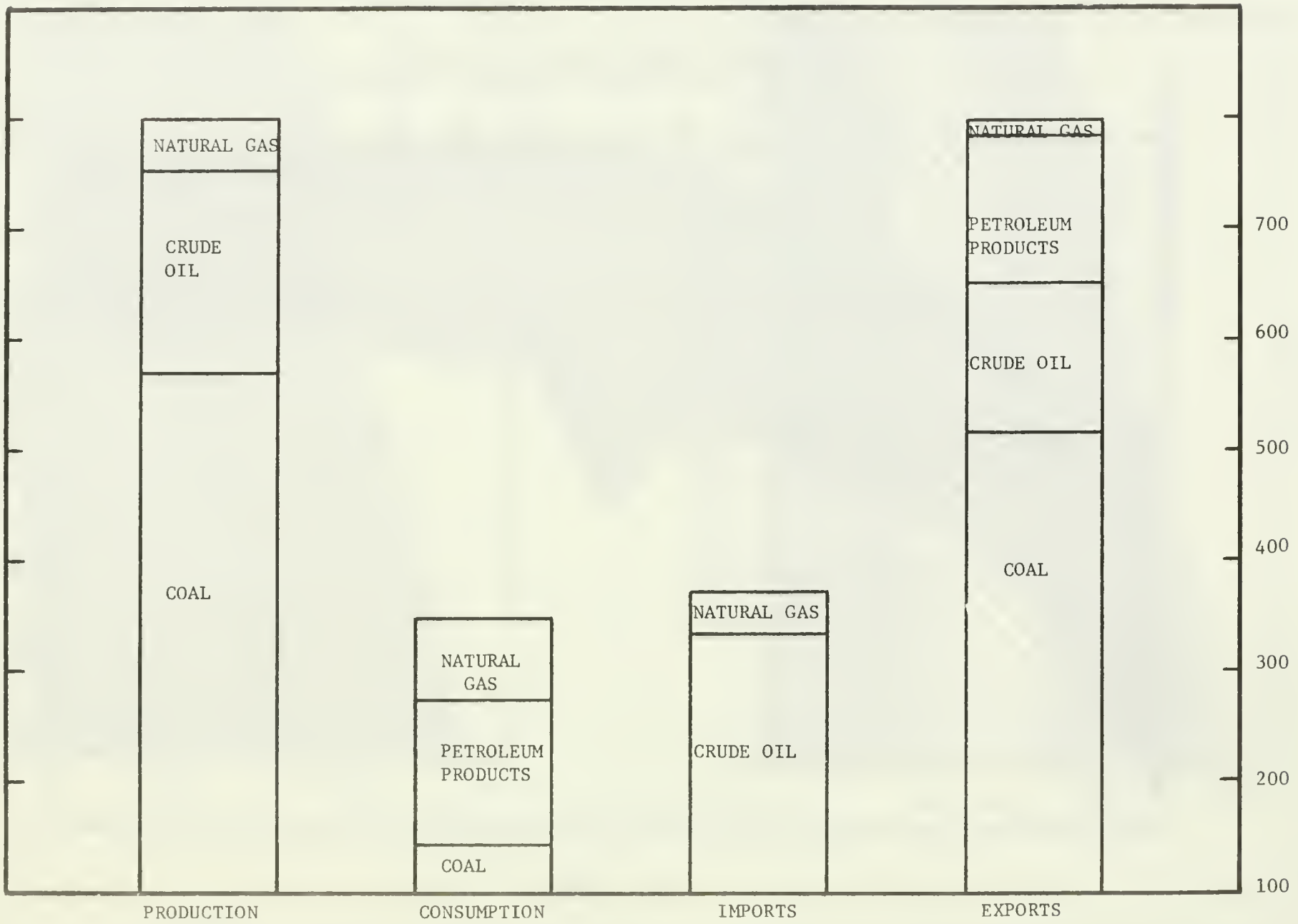

Consumption of Energy in Montana, By Type of Fuel
(In Trillion British Thermal Units)

Figure 1.6




Production of Energy in Montana, By Type of Fuel
(In Trillion British Thermal Units)

Figure 1.7




Production, Consumption, Imports and Exports of Fossil Fuels in Montana in 1976
(In Trillion British Thermal Units)

II

# ELECTRICITY

## HIGHLIGHTS

- Hydroelectric and fossil fuel plants in Montana generated a total of 16.1 billion KWH of electricity during 1976 -- an increase of 43 percent from 1975.

- Hydroelectric generation in 1976, at 12.4 billion KWH, was up 30 percent from a year earlier and accounted for 77 percent of the total generation of electricity.

- Coal-fired generation totaled 3.6 billion KWH, which is 130 percent above 1975 and accounts for 22 percent of the total generation. The large increase in coal-fired production is because of the additions of Colstrips 1 and 2, plus the addition of Libby 3 and 4.

- Sales of electricity in Montana by electric utilities totaled 9.6 billion KWH in 1976 -- up 12 percent from a year earlier.

- The average 1976 prices for electricity sold in Montana was 2.23 cents per KWH for residential customers, 2.06 cents per KWH for commercial customers and 0.60 cents per KWH for industrial customers.

- Industrial consumption of electricity in Montana during 1976 totaled 5.4 billion KWH which amounts to a 4.5 percent increase from 1975.

Table 2.1

Electric Generating Capacity in Montana

| Existing Hydro Plants | Type | Owner | Year of Completion | Name Plate Capacity (MW) | Location |
|---|---|---|---|---|---|
| 1. Madison | H | MPC | 1912 | 9.0 | Madison River |
| 2. Hauser | H | MPC | 1912 | 17.0 | Missouri River |
| 3. Holter | H | MPC | 1918 | 38.4 | Missouri River |
| 4. Black Eagle | H | MPC | 1929 | 16.8 | Missouri River |
| 5. Rainbow | H | MPC | 1929 | 35.6 | Missouri River |
| 6. Ryan | H | MPC | 1929 | 48.0 | Missouri River |
| 7. Morony | H | MPC | 1930 | 45.0 | Missouri River |
| 8. Cochrane | H | MPC | 1957 | 48.0 | Missouri River |
| 9. Mystic Lake | H | MPC | 1927 | 10.0 | West Rosebud Cr. |
| 10. Flint Creek | H | MPC | 1935 | 1.0 | Flint Creek |
| 11. Milltown | H | MPC | 1929 | 3.0 | Clark Fork River |
| 12. Thompson Falls | H | MPC | 1929 | 30.0 | Clark Fork River |
| 13. Kerr | H | MPC | 1938 | 168.0 | Flathead River |
| 14. Noxon | H | WWP | 1960 | 282.0 | Clark Fork River |
| 15. Big Fork | H | PPL | 1930 | 4.26 | Swan Lake |
| 16. Fort Peck | H | CE | 1940 | 165.0 | Missouri River |
| 17. Canyon Ferry | H | BR | 1954 | 50.0 | Missouri River |
| 18. Hungry Horse | H | BR | 1953 | 285.0 | S. Fork Flathead |
| 19. Yellowtail | H | BR | 1966 | 250.0 | Big Horn River |
| 20. Big Creek | H | FIP | 1916 | .36 | Big Creek |
| 21. Troy | H | MLP | 1916 | 4.5 | Lake Creek |
| 22. Libby 1-4 | H | CE | | 420.0 | Kootenai River |
| Total Hydropower | | | | 1930.92 | |
| **Existing Fossil Plants** | | | | | |
| 1. Frank Bird | S(oil/gas) | MPC | 1951 | 69.0 | Yellowstone River |
| 2. J.E. Corrette | S(coal) | MPC | 1968 | 173.0 | Yellowstone River |
| 3. Lewis and Clark | S(coal) | MDU | 1955 | 50.0 | Yellowstone River |
| 4. Libby (standby) | S(diesel) | | 1972 | 25.0 | |
| 5. Miles City | S(gas) | MDU | 1972 | 23.26 | |
| 6. Glendive | S(gas) | MDU | 1927 | 7.0 | |
| 7. Colstrip I | S(coal) | * | 1975 | 358.0 | |
| 8. Colstrip II | S(coal) | * | 1976 | 358.0 | |
| Total Fuels | | | | 1,063.26 | |
| Total Hydropower and Fuels | | | | 3,056.18 | |

H = Hydro S = Steam
* MPC and PSP&L
Source: Bonneville Power Administration

Table 2.2

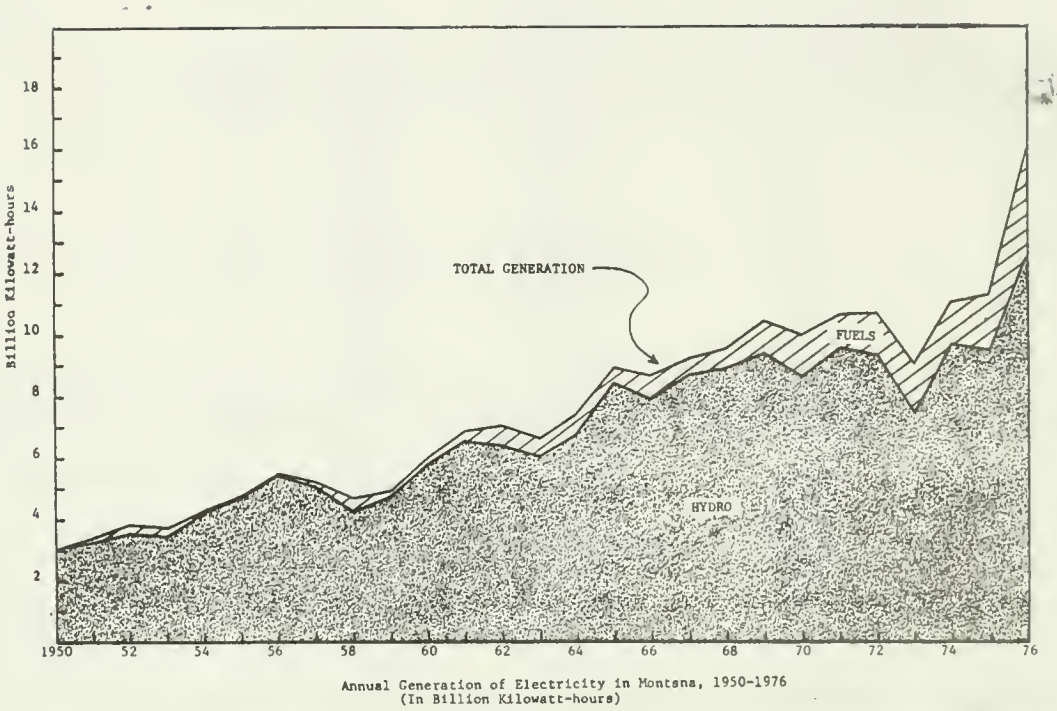
Annual Generation of Electricity in Montana
(Million KWH)

| Year | Total | Hydro | % | Coal | % | Oil | % | Gas | % | Wood & Waste | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1950 | 3,136 | 3,107 | 99% | NA | | NA | | NA | | NA | |
| 1951 | 3,304 | 3,259 | 99 | NA | | NA | | NA | | NA | |
| 1952 | 3,778 | 3,464 | 92 | NA | | NA | | NA | | NA | |
| 1953 | 3,719 | 3,424 | 92 | NA | | NA | | NA | | NA | |
| 1954 | 4,274 | 4,246 | 99 | NA | | NA | | NA | | NA | |
| 1955 | 4,696 | 4,679 | 99 | NA | | NA | | NA | | NA | |
| 1956 | 5,495 | 5,459 | 99 | NA | | NA | | NA | | NA | |
| 1957 | 5,215 | 4,969 | 95 | NA | | NA | | NA | | NA | |
| 1958 | 4,551 | 4,224 | 93 | NA | | NA | | NA | | NA | |
| 1959 | 4,934 | 4,720 | 96 | NA | | NA | | NA | | NA | |
| 1960 | 5,992 | 5,801 | 97 | NA | | NA | | NA | | NA | |
| 1961 | 6,780 | 6,499 | 96 | 263 | 4% | 0 | 0% | 19 | 1/ | 0 | 0% |
| 1962 | 7,051 | 6,410 | 91 | 291 | 4 | 1 | 1/ | 349 | 5% | 0 | 0 |
| 1963 | 6,594 | 6,011 | 91 | 284 | 4 | 0 | 0 | 299 | 5 | 0 | 0 |
| 1964 | 7,360 | 6,821 | 93 | 286 | 4 | 2 | 1/ | 220 | 3 | 31 | 1/ |
| 1965 | 8,882 | 8,389 | 94 | 285 | 3 | 0 | 0 | 171 | 2 | 37 | 1/ |
| 1966 | 8,611 | 7,940 | 92 | 317 | 4 | 43 | 1/ | 273 | 3 | 38 | 1/ |
| 1967 | 9,117 | 8,703 | 95 | 314 | 3 | 3 | 1/ | 41 | 1/ | 56 | 1 |
| 1968 | 9,495 | 8,925 | 94 | 434 | 5 | 10 | 1/ | 52 | 1/ | 74 | 1 |
| 1969 | 10,442 | 9,447 | 90 | 735 | 7 | 52 | 1/ | 147 | 1 | 61 | 1 |
| 1970 | 10,026 | 8,745 | 87 | 966 | 10 | 14 | 1/ | 228 | 2 | 73 | 1 |
| 1971 | 10,653 | 9,595 | 90 | 901 | 8 | 1 | 1/ | 96 | 1 | 60 | 1 |
| 1972 | 10,689 | 9,444 | 88 | 1,079 | 10 | 7 | 1/ | 108 | 1 | 50 | 1/ |
| 1973 | 9,132 | 7,517 | 82 | 1,303 | 14 | 69 | 1 | 195 | 2 | 48 | 1 |
| 1974 | 11,056 | 9,726 | 88 | 1,210 | 11 | 6 | 1/ | 98 | 1 | 16 | 1/ |
| 1975 | 11,231 | 9,560 | 85 | 1,544 | 14 | 17 | 1/ | 96 | 1 | 14 | 1/ |
| 1976 | 16,090 | 12,406 | 77 | 3,556 | 22 | 32 | 1/ | 64 | 1/ | 32 | 1/ |

1/ less than 0.5

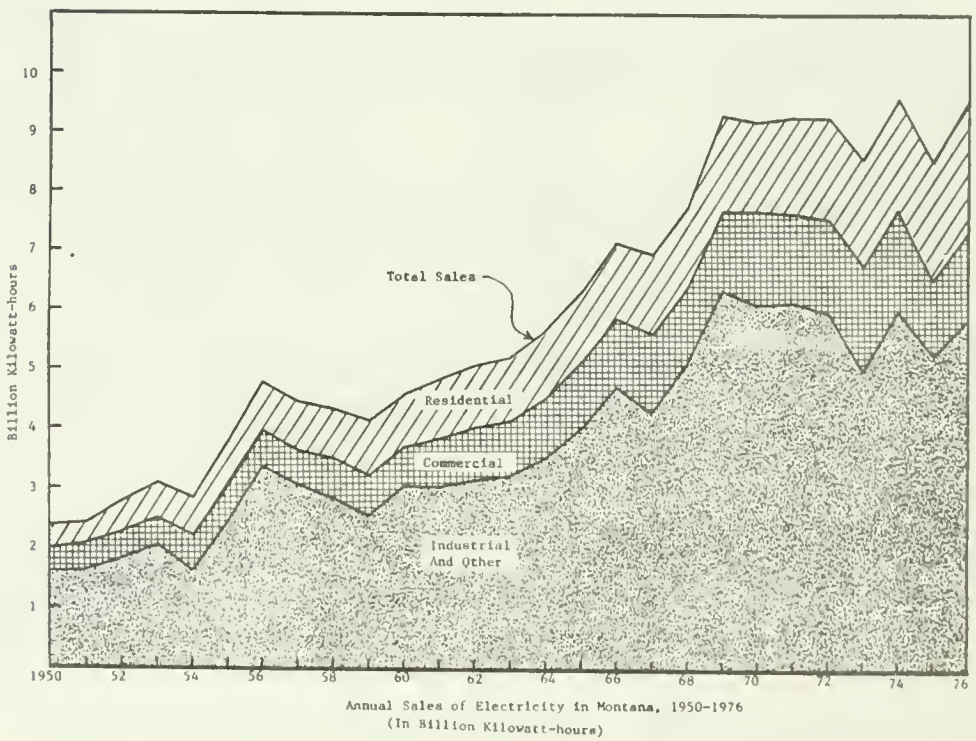
Source: Federal Power Commission

Figure 2.1




Annual Generation of Electricity in Montana, 1950-1976
(In Billion Kilowatt-hours)

Figure 2.2




Annual Sales of Electricity in Montana, 1950-1976
(In Billion Kilowatt-hours)

Table 2.3

Monthly Sales of Electricity
in Montana by Electric Utilities
(thousand KWH)

| Year | Sector | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1960 | Residential | 87,817 | 86,156 | 86,172 | 78,700 | 74,016 | 71,708 | 69,122 | 70,021 | 72,281 | 72,788 | 78,160 | 88,423 | 935,364 |
| | Commercial | 40,851 | 40,920 | 40,693 | 37,987 | 38,233 | 37,677 | 37,542 | 39,941 | 40,747 | 39,473 | 40,556 | 44,419 | 479,039 |
| | Industrial | 192,702 | 206,245 | 262,319 | 263,102 | 267,841 | 261,080 | 249,175 | 250,586 | 249,098 | 255,737 | 243,306 | 250,196 | 2,951,387 |
| | Other | 15,930 | 16,460 | 17,522 | 17,095 | 16,958 | 16,398 | 16,005 | 19,356 | 18,150 | 18,847 | 17,586 | 18,413 | 208,720 |
| | Total | 337,300 | 349,781 | 406,706 | 396,884 | 397,048 | 386,863 | 371,844 | 379,904 | 380,276 | 386,845 | 379,608 | 401,451 | 4,574,510 |
| 1961 | Residential | 94,714 | 89,265 | 82,793 | 79,128 | 78,238 | 75,587 | 72,428 | 72,221 | 77,654 | 79,289 | 83,809 | 96,727 | 981,853 |
| | Commercial | 43,745 | 44,111 | 40,965 | 40,209 | 40,766 | 43,527 | 42,932 | 42,376 | 45,316 | 41,664 | 44,097 | 48,062 | 517,770 |
| | Industrial | 245,523 | 222,879 | 241,307 | 239,366 | 255,179 | 250,378 | 254,137 | 249,779 | 237,969 | 252,472 | 254,771 | 271,577 | 2,975,337 |
| | Other | 17,447 | 17,069 | 18,282 | 16,729 | 17,031 | 17,904 | 18,566 | 21,490 | 20,826 | 18,835 | 18,577 | 19,636 | 222,392 |
| | Total | 401,429 | 373,324 | 383,347 | 375,432 | 391,214 | 387,396 | 388,063 | 385,866 | 381,765 | 392,260 | 401,254 | 436,002 | 4,697,352 |
| 1962 | Residential | 103,908 | 101,586 | 94,433 | 87,906 | 78,729 | 80,367 | 75,441 | 75,490 | 79,620 | 80,599 | 86,901 | 96,516 | 1,041,496 |
| | Commercial | 48,422 | 48,102 | 45,271 | 44,031 | 43,209 | 43,721 | 44,099 | 45,949 | 45,939 | 44,353 | 47,717 | 49,951 | 550,764 |
| | Industrial | 270,801 | 243,237 | 277,876 | 277,380 | 283,922 | 271,608 | 244,388 | 238,120 | 228,811 | 252,574 | 249,926 | 260,819 | 3,099,462 |
| | Other | 19,118 | 18,525 | 21,089 | 21,697 | 19,619 | 19,238 | 20,484 | 23,301 | 22,951 | 23,013 | 21,460 | 23,893 | 254,388 |
| | Total | 442,249 | 411,450 | 438,669 | 431,014 | 425,479 | 414,934 | 384,412 | 382,860 | 377,321 | 400,539 | 406,004 | 431,179 | 4,946,110 |
| 1963 | Residential | 103,835 | 110,481 | 94,644 | 86,648 | 85,447 | 81,989 | 79,996 | 80,482 | 82,349 | 82,375 | 87,151 | 102,086 | 1,077,483 |
| | Commercial | 49,276 | 50,336 | 46,788 | 46,194 | 45,541 | 46,639 | 47,013 | 48,163 | 48,917 | 46,782 | 47,620 | 50,646 | 573,915 |
| | Industrial | 263,088 | 244,329 | 269,286 | 260,528 | 257,708 | 252,494 | 254,657 | 265,693 | 263,189 | 279,350 | 279,286 | 301,282 | 3,190,890 |
| | Other | 22,146 | 22,082 | 22,755 | 21,353 | 21,007 | 20,379 | 19,564 | 24,581 | 22,728 | 21,934 | 19,814 | 20,273 | 258,616 |
| | Total | 438,345 | 427,228 | 433,473 | 414,723 | 409,703 | 401,501 | 401,230 | 418,919 | 417,183 | 430,441 | 433,871 | 474,287 | 5,100,904 |
| 1964 | Residential | 113,972 | 104,130 | 99,613 | 98,215 | 90,238 | 83,836 | 83,917 | 85,367 | 86,431 | 89,147 | 93,850 | 109,881 | 1,138,597 |
| | Commercial | 53,376 | 52,679 | 50,467 | 49,839 | 48,678 | 47,549 | 48,107 | 52,939 | 50,029 | 49,286 | 52,242 | 54,615 | 609,806 |
| | Industrial | 269,594 | 278,635 | 307,385 | 287,199 | 310,487 | 305,908 | 295,793 | 296,836 | 299,569 | 307,596 | 299,974 | 284,944 | 3,543,920 |
| | Other | 21,883 | 22,113 | 21,961 | 20,066 | 20,042 | 19,200 | 19,516 | 22,078 | 17,852 | 21,559 | 20,456 | 21,846 | 248,572 |
| | Total | 458,825 | 457,557 | 479,426 | 455,319 | 469,445 | 456,493 | 447,333 | 457,220 | 453,881 | 467,588 | 466,522 | 471,286 | 5,540,895 |

Table 2.3 (Continued)

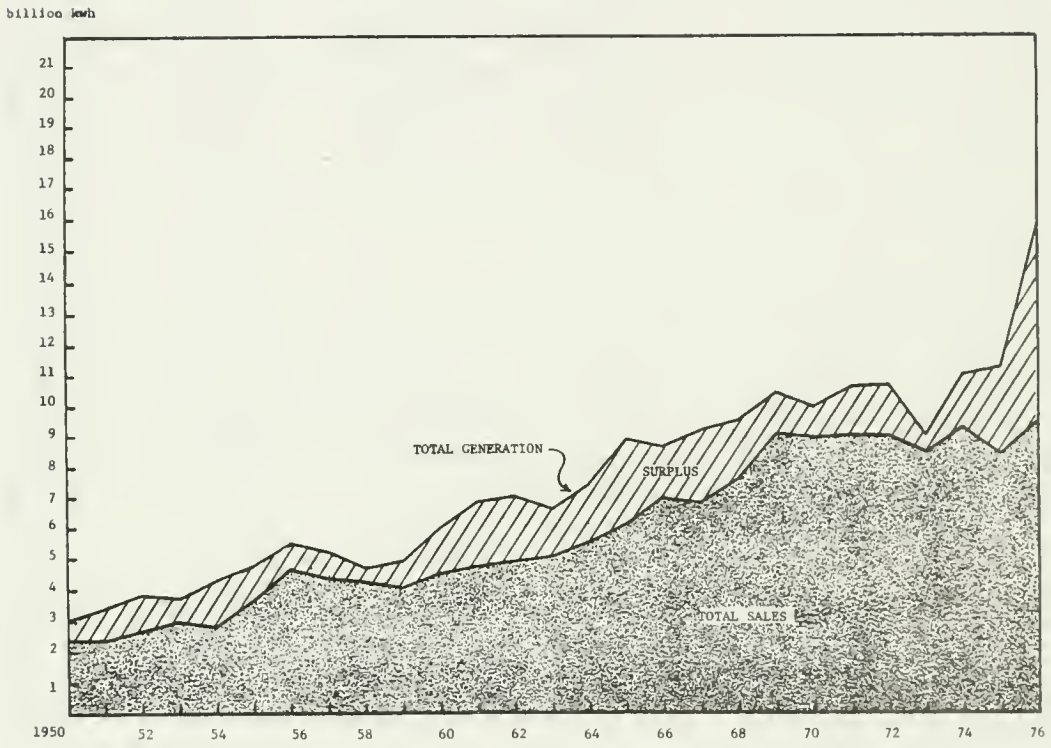
| Year | Sector | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1965 | Residential | 129,757 | 113,046 | 107,890 | 106,939 | 94,738 | 90,005 | 87,104 | 89,052 | 92,750 | 97,290 | 96,245 | 111,332 | 1,216,148 |
| | Commercial | 58,183 | 55,780 | 53,569 | 54,060 | 53,351 | 50,867 | 51,996 | 56,258 | 54,504 | 54,215 | 54,487 | 57,001 | 654,271 |
| | Industrial | 295,828 | 283,795 | 302,647 | 308,369 | 315,466 | 328,079 | 292,282 | 310,484 | 365,742 | 379,338 | 377,321 | 380,099 | 3,939,450 |
| | Other | 23,186 | 23,626 | 23,660 | 22,740 | 22,635 | 20,825 | 21,123 | 23,415 | 20,177 | 22,706 | 22,808 | 23,594 | 270,495 |
| | Total | 506,954 | 476,247 | 487,766 | 492,108 | 486,190 | 489,776 | 452,505 | 479,209 | 533,173 | 553,549 | 550,861 | 572,026 | 6,080,364 |
| 1966 | Residential | 121,350 | 124,626 | 113,653 | 103,495 | 99,313 | 93,596 | 91,931 | 93,336 | 96,337 | 96,360 | 105,035 | 122,301 | 1,261,333 |
| | Commercial | 58,913 | 60,674 | 57,259 | 55,579 | 55,861 | 55,136 | 57,741 | 59,368 | 59,127 | 58,393 | 59,464 | 60,268 | 697,783 |
| | Industrial | 387,237 | 351,127 | 381,773 | 375,749 | 384,072 | 376,720 | 381,588 | 391,139 | 394,768 | 398,414 | 405,337 | 429,369 | 4,657,293 |
| | Other | 24,598 | 25,287 | 26,810 | 24,087 | 23,293 | 21,871 | 22,643 | 24,784 | 21,636 | 24,241 | 22,453 | 24,169 | 285,872 |
| | Total | 592,098 | 561,714 | 579,495 | 558,910 | 562,539 | 547,323 | 553,903 | 568,627 | 571,868 | 577,408 | 592,289 | 636,107 | 6,902,281 |
| 1967 | Residential | 126,433 | 118,444 | 114,427 | 111,864 | 102,479 | 98,793 | 96,131 | 93,841 | 99,771 | 97,523 | 107,138 | 123,724 | 1,290,568 |
| | Commercial | 63,164 | 62,283 | 60,029 | 59,857 | 58,476 | 58,722 | 59,151 | 62,878 | 65,324 | 69,143 | 62,491 | 64,956 | 746,474 |
| | Industrial | 399,328 | 371,653 | 396,090 | 389,956 | 414,910 | 409,363 | 349,729 | 306,514 | 311,801 | 313,395 | 304,872 | 314,563 | 4,282,174 |
| | Other | 24,113 | 25,248 | 26,258 | 25,110 | 23,481 | 23,089 | 23,918 | 25,814 | 22,892 | 24,081 | 24,225 | 24,749 | 292,978 |
| | Total | 613,038 | 577,628 | 596,804 | 586,787 | 599,346 | 589,967 | 528,929 | 489,047 | 499,788 | 504,142 | 498,726 | 527,992 | 6,612,194 |
| 1968 | Residential | 143,663 | 132,768 | 121,232 | 108,338 | 106,581 | 104,089 | 100,963 | 103,557 | 102,645 | 105,823 | 114,265 | 129,362 | 1,373,286 |
| | Commercial | 71,463 | 67,767 | 65,410 | 61,562 | 63,963 | 65,534 | 62,364 | 67,865 | 66,533 | 72,710 | 68,798 | 71,000 | 804,969 |
| | Industrial | 349,224 | 301,692 | 313,222 | 359,362 | 415,545 | 412,147 | 410,516 | 463,261 | 453,171 | 470,785 | 514,629 | 518,356 | 4,981,910 |
| | Other | 26,187 | 27,093 | 27,845 | 22,534 | 21,925 | 21,883 | 20,467 | 23,614 | 19,135 | 21,451 | 20,882 | 19,966 | 272,982 |
| | Total | 590,537 | 529,320 | 527,709 | 551,796 | 608,014 | 603,653 | 594,310 | 658,297 | 641,484 | 670,769 | 718,574 | 738,684 | 7,433,147 |
| 1969 | Residential | 152,981 | 157,716 | 137,080 | 120,995 | 107,597 | 107,005 | 106,310 | 107,962 | 110,372 | 109,020 | 123,285 | 121,922 | 1,462,245 |
| | Commercial | 73,626 | 79,263 | 69,229 | 68,222 | 67,227 | 67,699 | 67,513 | 72,415 | 73,330 | 78,114 | 71,722 | 75,036 | 863,396 |
| | Industrial | 523,416 | 499,814 | 517,631 | 515,532 | 524,633 | 515,044 | 509,530 | 520,316 | 490,956 | 517,126 | 543,581 | 530,666 | 6,208,245 |
| | Other | 20,957 | 23,362 | 24,550 | 21,783 | 21,110 | 20,894 | 17,922 | 19,890 | 18,498 | 19,675 | 19,626 | 18,842 | 247,109 |
| | Total | 770,980 | 760,155 | 748,490 | 726,532 | 720,567 | 710,642 | 701,275 | 720,583 | 693,156 | 723,935 | 758,214 | 746,466 | 8,780,995 |
| 1970 | Residential | 152,800 | 147,131 | 130,734 | 126,382 | 120,747 | 111,014 | 111,686 | 117,988 | 117,328 | 120,147 | 129,342 | 148,732 | 1,534,031 |
| | Commercial | 78,481 | 78,370 | 72,151 | 72,549 | 72,646 | 70,889 | 74,235 | 80,235 | 79,091 | 87,240 | 77,183 | 80,540 | 923,610 |
| | Industrial | 535,198 | 507,080 | 517,064 | 521,683 | 524,102 | 499,228 | 509,589 | 489,343 | 464,671 | 493,165 | 497,404 | 470,212 | 6,028,739 |
| | Other | 20,146 | 22,016 | 24,030 | 22,554 | 22,192 | 22,161 | 24,076 | 24,744 | 20,763 | 20,118 | 21,019 | 19,914 | 263,733 |
| | Total | 786,625 | 754,597 | 743,979 | 743,168 | 739,687 | 703,292 | 719,586 | 712,310 | 681,853 | 720,670 | 724,948 | 719,398 | 8,750,113 |

Table 2.3 (Continued)

| Year | Sector | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1971 | Residential | 171,644 | 157,263 | 138,901 | 135,619 | 123,858 | 117,446 | 118,165 | 122,788 | 129,015 | 124,349 | 136,480 | 157,000 | 1,632,528 |
| | Commercial | 87,202 | 83,537 | 78,458 | 78,899 | 78,903 | 76,350 | 78,401 | 82,514 | 85,580 | 92,637 | 80,452 | 86,892 | 989,825 |
| | Industrial | 512,277 | 490,144 | 496,830 | 510,798 | 528,034 | 528,014 | 454,859 | 428,468 | 378,792 | 519,353 | 551,435 | 600,152 | 5,999,156 |
| | Other | 21,318 | 22,036 | 21,285 | 23,467 | 23,067 | 21,581 | 22,505 | 24,363 | 21,012 | 21,838 | 22,599 | 23,406 | 268,477 |
| | Total | 792,441 | 752,980 | 735,474 | 748,783 | 753,862 | 743,391 | 673,930 | 658,133 | 614,399 | 758,177 | 790,966 | 867,450 | 8,889,986 |
| 1972 | Residential | 196,308 | 174,977 | 159,083 | 139,973 | 129,697 | 129,433 | 126,990 | 125,023 | 134,719 | 131,454 | 146,473 | 174,196 | 1,768,326 |
| | Commercial | 99,573 | 98,759 | 85,723 | 82,667 | 80,349 | 85,918 | 84,421 | 84,408 | 91,807 | 91,910 | 87,636 | 96,428 | 1,069,599 |
| | Industrial | 383,841 | 367,497 | 547,387 | 532,198 | 531,324 | 484,725 | 494,943 | 480,897 | 475,312 | 492,458 | 470,817 | 398,909 | 5,660,308 |
| | Other | 22,537 | 21,683 | 23,962 | 22,315 | 22,021 | 22,468 | 20,535 | 22,039 | 21,171 | 21,633 | 21,567 | 22,610 | 264,541 |
| | Total | 702,259 | 662,916 | 816,155 | 777,153 | 763,391 | 722,544 | 726,889 | 712,367 | 723,009 | 737,455 | 726,493 | 692,143 | 8,762,774 |
| 1973 | Residential | 196,308 | 174,977 | 155,431 | 145,404 | 136,810 | 131,440 | 134,731 | 138,222 | 142,991 | 134,836 | 151,242 | 169,992 | 1,812,384 |
| | Commercial | 99,573 | 98,759 | 91,616 | 89,892 | 88,813 | 89,850 | 94,218 | 99,168 | 98,973 | 89,397 | 92,215 | 92,810 | 1,125,284 |
| | Industrial | 383,841 | 367,497 | 429,807 | 429,508 | 391,416 | 370,707 | 384,180 | 428,935 | 434,784 | 466,258 | 478,403 | 468,563 | 5,033,899 |
| | Other | 22,537 | 21,683 | 22,045 | 21,664 | 21,123 | 20,615 | 20,508 | 20,327 | 18,181 | 18,956 | 18,528 | 19,528 | 245,695 |
| | Total | 702,259 | 662,916 | 698,899 | 686,468 | 638,162 | 612,612 | 633,637 | 686,652 | 694,929 | 709,447 | 740,388 | 750,893 | 8,217,262 |
| 1974 | Residential | 185,102 | 178,463 | 154,353 | 152,674 | 139,598 | 142,545 | 146,882 | 156,208 | 145,167 | 141,631 | 154,677 | 175,550 | 1,872,850 |
| | Commercial | 98,697 | 97,157 | 90,171 | 91,900 | 86,088 | 91,539 | 98,340 | 104,597 | 96,879 | 103,383 | 95,650 | 102,055 | 1,156,456 |
| | Industrial | 492,483 | 491,482 | 504,374 | 447,331 | 439,410 | 450,886 | 507,271 | 511,013 | 504,551 | 545,501 | 546,527 | 487,813 | 5,928,642 |
| | Other | 20,837 | 21,098 | 21,008 | 19,541 | 19,077 | 17,505 | 16,576 | 16,611 | 14,336 | 16,962 | 13,771 | 15,859 | 213,181 |
| | Total | 797,119 | 788,200 | 769,906 | 711,446 | 684,173 | 702,475 | 769,069 | 788,429 | 760,933 | 807,477 | 810,625 | 781,277 | 9,171,129 |
| 1975 | Residential | 197,113 | 197,400 | 185,873 | 172,523 | 162,091 | 150,032 | 154,294 | 164,663 | 160,058 | 144,833 | 170,283 | 198,560 | 2,057,723 |
| | Commercial | 106,850 | 109,601 | 105,285 | 97,526 | 100,689 | 97,171 | 102,615 | 110,064 | 103,845 | 116,764 | 102,254 | 97,590 | 1,250,254 |
| | Industrial | 502,334 | 468,418 | 444,306 | 423,351 | 420,191 | 394,480 | 391,641 | 384,746 | 402,479 | 413,633 | 438,613 | 385,277 | 5,069,469 |
| | Other | 16,027 | 16,803 | 16,816 | 15,749 | 15,943 | 17,103 | 16,433 | 17,883 | 15,282 | 16,100 | 16,484 | 16,730 | 197,353 |
| | Total | 822,324 | 792,222 | 752,280 | 709,149 | 698,914 | 658,786 | 664,983 | 677,356 | 681,664 | 691,330 | 727,634 | 698,157 | 8,574,799 |
| 1976 | Residential | 241,286 | 224,354 | 215,650 | 188,027 | 172,354 | 155,076 | 159,897 | 163,718 | 163,180 | 161,084 | 188,024 | 227,972 | 2,260,622 |
| | Commercial | 135,656 | 120,033 | 138,292 | 125,658 | 117,737 | 118,578 | 123,076 | 127,036 | 127,802 | 123,816 | 128,418 | 139,325 | 1,525,427 |
| | Industrial | 430,307 | 417,454 | 418,118 | 422,976 | 475,160 | 524,969 | 536,980 | 509,190 | 242,368 | 534,606 | 553,161 | 536,896 | 5,602,185 |
| | Other | 18,228 | 18,619 | 17,927 | 17,454 | 17,249 | 16,683 | 15,884 | 31,570 | 347 | 15,931 | 16,427 | 16,754 | 203,073 |
| | Total | 825,477 | 780,460 | 789,987 | 754,115 | 782,500 | 815,306 | 835,837 | 831,514 | 533,697 | 835,437 | 886,030 | 920,947 | 9,591,307 |

Source: Federal Power Commission

Figure 2.3




Annual Generation and Sales of Electricity in Montana, 1950-1976
(In Billion Kilowatt-Hours)

Table 2.4

Annual Sales of Electricity by the
Electric Utility Industry in Montana
(million KWH)

| Year | Total Sales | Residential | Commercial | Industrial | Street & Highway Lighting | Other Public Sales | Rail-roads | Inter-depart-mental |
|---|---|---|---|---|---|---|---|---|
| 1950 | 2,351 | 378 | 219 | 1,559 | 16 | 15 | 154 | 11 |
| 1951 | 2,437 | 423 | 238 | 1,566 | 18 | 19 | 164 | 10 |
| 1952 | 2,699 | 484 | 256 | 1,757 | 20 | 17 | 159 | 6 |
| 1953 | 3,002 | 501 | 302 | 1,987 | 20 | 33 | 154 | 5 |
| 1954 | 2,772 | 562 | 351 | 1,649 | 24 | 33 | 145 | 8 |
| 1955 | 3,658 | 643 | 389 | 2,407 | 25 | 34 | 154 | 6 |
| 1956 | 4,666 | 720 | 416 | 3,309 | 26 | 37 | 153 | 5 |
| 1957 | 4,418 | 782 | 462 | 2,975 | 28 | 40 | 127 | 4 |
| 1958 | 4,268 | 810 | 474 | 2,796 | 29 | 43 | 108 | 8 |
| 1959 | 4,074 | 893 | 512 | 2,468 | 30 | 55 | 99 | 17 |
| 1960 | 4,617 | 935 | 529 | 2,973 | 33 | 52 | 89 | 6 |
| 1961 | 4,774 | 953 | 603 | 3,028 | 33 | 69 | 83 | 5 |
| 1962 | 5,044 | 1.024 | 652 | 3.152 | 36 | 82 | 91 | 7 |
| 1963 | 5,192 | 1,055 | 715 | 3,190 | 36 | 102 | 88 | 6 |
| 1964 | 5,647 | 1,117 | 772 | 3,534 | 39 | 105 | 75 | 5 |
| 1965 | 6,228 | 1,172 | 846 | 3,965 | 40 | 114 | 85 | 6 |
| 1966 | 7,076 | 1,207 | 894 | 4,718 | 43 | 121 | 88 | 6 |
| 1967 | 6,866 | 1,310 | 936 | 4,338 | 43 | 144 | 82 | 13 |
| 1968 | 7,741 | 1,385 | 1,027 | 5,055 | 47 | 140 | 69 | 18 |
| 1969 | 9,152 | 1,469 | 1,117 | 6,316 | 51 | 123 | 57 | 19 |
| 1970 | 9,091 | 1,521 | 1,188 | 6,120 | 52 | 117 | 73 | 20 |
| 1971 | 9,214 | 1,614 | 1,254 | 6,079 | 53 | 113 | 80 | 21 |
| 1972 | 9,191 | 1,710 | 1,325 | 5,888 | 53 | 113 | 81 | 21 |
| 1973 | 8,572 | 1,852 | 1,447 | 5,031 | 55 | 117 | 52 | 18 |
| 1974 | 9,540 | 1,877 | 1,488 | 5,963 | 57 | 113 | 23 | 19 |
| 1975 | 8,867 | 2,038 | 1,544 | 5,089 | 64 | 113 | - | 19 |
| 1976 | 9,891 | 2,232 | 1,669 | 5,795 | 60 | 115 | - | 20 |

Source: Edison Electric Institute

Table 2.5

Average Annual Prices for
Electricity Sold in Montana
(Cents/KWH)

| Year | Total Sales | Residential | Commercial | Industrial | Street & Highway Lighting | Other Public Sales | Rail-roads | Inter-depart-mental |
|---|---|---|---|---|---|---|---|---|
| 1950 | 1.06 | 2.70 | 2.42 | 0.50 | 2.41 | 0.84 | 0.57 | 0.54 |
| 1951 | 1.08 | 2.66 | 2.37 | 0.51 | 2.32 | 0.73 | 0.54 | 0.56 |
| 1952 | 1.08 | 2.60 | 2.39 | 0.50 | 2,28 | 0.80 | 0.54 | 0.82 |
| 1953 | 1.03 | 2.52 | 2.42 | 0.47 | 2.35 | 0.52 | 0.54 | 0.88 |
| 1954 | 1.14 | 2.44 | 2.37 | 0.48 | 2.18 | 0.58 | 0.54 | 0.73 |
| 1955 | 0.99 | 2.34 | 2.32 | 0.43 | 2.25 | 0.60 | 0.54 | 0.92 |
| 1956 | 0.86 | 2.34 | 2.17 | 0.38 | 2.32 | 0.65 | 0.55 | 1.10 |
| 1957 | 0.93 | 2.28 | 2.08 | 0.40 | 2.30 | 0.66 | 0.54 | 1.38 |
| 1958 | 0.99 | 2.34 | 2.15 | 0.41 | 2.39 | 0.67 | 0.54 | 0.88 |
| 1959 | 1.10 | 2.37 | 2.22 | 0.43 | 2.56 | 0.70 | 0.55 | 0.59 |
| 1960 | 1.05 | 2.33 | 2.25 | 0.43 | 2.45 | 0.79 | 0.56 | 1.27 |
| 1961 | 1.06 | 2.32 | 2.18 | 0.45 | 2.70 | 0.74 | 0.55 | 1.70 |
| 1962 | 1.07 | 2.29 | 2.13 | 0.46 | 2.50 | 0.61 | 0.55 | 1.43 |
| 1963 | 1.07 | 2.25 | 2.06 | 0.45 | 2.78 | 0.78 | 0.57 | 1.67 |
| 1964 | 1.03 | 2.20 | 2.02 | 0.45 | 2.56 | 0.71 | 0.53 | 2.00 |
| 1965 | 0.98 | 2.12 | 1.93 | 0.44 | 2.75 | 0.70 | 0.59 | 1.67 |
| 1966 | 0.92 | 2.09 | 1.92 | 0.43 | 2.56 | 0.66 | 0.57 | 1.67 |
| 1967 | 0.95 | 2.04 | 1.89 | 0.42 | 2.79 | 0.63 | 0.49 | 1.08 |
| 1968 | 0.90 | 1.99 | 1.83 | 0.40 | 2.77 | 0.61 | 0.58 | 1.11 |
| 1969 | 0.88 | 2.10 | 1.93 | 0.41 | 2.75 | 0.57 | 0.53 | 1.05 |
| 1970 | 0.94 | 2.13 | 1.94 | 0.42 | 2.88 | 0.60 | 0.55 | 1.00 |
| 1971 | 0.95 | 2.12 | 1.94 | 0.43 | 3.02 | 0.62 | 0.50 | 0.95 |
| 1972 | 1.00 | 2.16 | 1.98 | 0.44 | 3.21 | 0.53 | 0.49 | 1.19 |
| 1973 | 1.16 | 2.21 | 2.04 | 0.53 | 3.27 | 0.60 | 0.58 | 1.67 |
| 1974 | 1.10 | 2.23 | 2.05 | 0.50 | 3.23 | 0.58 | 0.53 | 1.41 |
| 1975 | 1.25 | 2.19 | 2.08 | 0.62 | 2.99 | 0.58 | | 1.51 |
| 1976 | 1.24 | 2.23 | 2.06 | 0.60 | 3.32 | 0.73 | | 1.67 |

Source: Edison Electric Institute

Table 2.6

Consumption of Fuels by Electric Utilities in Montana
(Units: Coal = 1000 tons, Oil = 1000 barrels, Gas = 1000 MCF)

| Year | Fuel | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1960 | Coal | 22.6 | 20.0 | 21.3 | 15.2 | 14.2 | 4.8 | 13.5 | 14.7 | 9.1 | 11.9 | 15.7 | 23.9 | 186.9 |
| | Oil | 0.0 | 1/ | 1/ | 1/ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1/ |
| | Gas | 51.1 | 44.0 | 52.8 | 49.0 | 25.8 | 16.7 | 7.7 | 9.2 | 12.1 | 7.3 | 17.1 | 48.5 | 341.3 |
| 1961 | Coal | 24.1 | 19.8 | 25.6 | 21.9 | 25.0 | 5.6 | 20.1 | 23.9 | 18.3 | 23.1 | 24.7 | 30.4 | 262.5 |
| | Oil | 0.0 | 0.0 | 0.0 | 1/ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1/ |
| | Gas | 30.2 | 24.6 | 18.9 | 18.0 | 8.2 | 7.7 | 7.3 | 9.9 | 6.3 | 17.6 | 9.2 | 198.2 | 356.2 |
| 1962 | Coal | 29.5 | 25.7 | 29.3 | 23.3 | 26.2 | 11.7 | 21.8 | 23.9 | 19.9 | 26.4 | 23.6 | 30.3 | 291.6 |
| | Oil | 0.9 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 |
| | Gas | 329.0 | 312.4 | 396.4 | 374.2 | 148.1 | 100.7 | 6.7 | 308.7 | 488.0 | 506.3 | 485.2 | 256.8 | 3,712.5 |
| 1963 | Coal | 31.8 | 27.1 | 26.2 | 27.3 | 29.0 | 3.5 | 24.4 | 25.9 | 17.3 | 25.5 | 22.4 | 25.1 | 285.5 |
| | Oil | 0.6 | 0.0 | 0.0 | 0.0 | 1/ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 |
| | Gas | 341.7 | 220.0 | 275.3 | 263.3 | 28.6 | 160.2 | 209.0 | 351.2 | 413.7 | 363.8 | 308.2 | 368.3 | 3,303.3 |
| 1964 | Coal | 21.8 | 19.9 | 25.3 | 21.5 | 24.5 | 28.0 | 25.7 | 23.9 | 18.7 | 24.8 | 26.2 | 33.5 | 293.8 |
| | Oil | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | 3.6 |
| | Gas | 213.7 | 202.8 | 213.8 | 200.7 | 58.9 | 132.8 | 194.3 | 237.9 | 283.2 | 276.4 | 186.3 | 248.7 | 2,449.5 |
| 1965 | Coal | 29.4 | 24.4 | 28.2 | 28.6 | 21.1 | 23.0 | 25.5 | 12.3 | 26.6 | 26.0 | 27.2 | 23.5 | 295.8 |
| | Oil | 0.0 | 1/ | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1/ | 0.3 | 0.0 | 0.0 | 0.2 | 0.7 |
| | Gas | 199.3 | 176.8 | 187.6 | 173.0 | 5.7 | 115.8 | 163.6 | 179.4 | 185.4 | 185.2 | 191.6 | 228.9 | 1,992.3 |
| 1966 | Coal | 31.9 | 29.5 | 24.8 | 27.4 | 30.3 | 27.0 | 29.1 | 12.8 | 25.1 | 28.7 | 27.8 | 29.1 | 323.5 |
| | Oil | 0.5 | 0.0 | 1.3 | 0.4 | 0.3 | 0.1 | 3.3 | 24.0 | 20.8 | 20.9 | 10.6 | 0.0 | 82.2 |
| | Gas | 225.9 | 192.0 | 209.7 | 189.3 | 217.9 | 161.0 | 260.1 | 267.3 | 241.1 | 297.5 | 408.4 | 307.0 | 2,977.2 |
| 1967 | Coal | 29.8 | 29.0 | 28.6 | 24.8 | 27.0 | 19.8 | 20.9 | 27.6 | 28.8 | 27.8 | 27.8 | 33.5 | 325.4 |
| | Oil | 1/ | 2.0 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1/ | 0.0 | 1/ | 0.0 | 6.1 |
| | Gas | 223.0 | 171.8 | 56.5 | 12.0 | 3.7 | 6.6 | 5.3 | 4.3 | 3.1 | 6.5 | 4.9 | 4.8 | 502.5 |

1/ less than 0.1

Source: Federal Energy Regulatory Commission (formerly Federal Power Commission), Form 4 News Releases

Table 2.6 (Continued)

| Year | Fuel | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1968 | Coal | 34.4 | 29.6 | 25.1 | 29.7 | 28.7 | 28.6 | 25.7 | 19.9 | 33.9 | 56.5 | 37.8 | 49.3 | 399.2 |
| | Oil | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1/ | 8.2 | 3.2 | 0.0 | 1/ | 3.3 | 8.1 | 22.9 |
| | Gas | 7.5 | 2.9 | 3.7 | 1.8 | 3.8 | 2.8 | 97.4 | 142.3 | 30.0 | 85.6 | 120.1 | 133.4 | 631.3 |
| 1969 | Coal | 59.6 | 52.9 | 56.9 | 47.6 | 30.3 | 27.8 | 44.8 | 35.6 | 77.6 | 44.2 | 41.5 | 57.8 | 576.6 |
| | Oil | 11.9 | 1.5 | 5.5 | 0.0 | 3.4 | 2.8 | 1.3 | 0.5 | 0.0 | 37.1 | 25.5 | 15.4 | 104.9 |
| | Gas | 149.4 | 91.3 | 115.4 | 82.2 | 138.9 | 177.4 | 123.3 | 86.2 | 92.3 | 178.2 | 149.2 | 136.7 | 1,520.5 |
| 1970 | Coal | 82.4 | 56.9 | 67.5 | 51.2 | 36.9 | 25.5 | 29.6 | 33.3 | 67.0 | 89.7 | 91.1 | 91.6 | 722.7 |
| | Oil | 13.0 | 11.3 | 1.4 | 0.0 | 1/ | 0.1 | 0.1 | 0.0 | 0.0 | 1/ | 0.0 | 1/ | 26.0 |
| | Gas | 159.7 | 126.5 | 106.4 | 94.5 | 160.2 | 197.2 | 294.7 | 141.4 | 70.3 | 106.0 | 457.6 | 614.9 | 2,529.4 |
| 1971 | Coal | 92.0 | 60.5 | 58.3 | 48.4 | 43.3 | 44.4 | 33.9 | 15.7 | 30.3 | 71.0 | 87.5 | 86.7 | 672.0 |
| | Oil | 1/ | 0.1 | 1/ | 0.0 | 1/ | 1/ | 1/ | 0.0 | 0.0 | 1/ | 0.0 | 0.0 | 0.2 |
| | Gas | 279.3 | 76.8 | 68.7 | 58.4 | 150.3 | 123.1 | 15.4 | 4.0 | 17.0 | 61.3 | 79.3 | 146.2 | 1,079.8 |
| 1972 | Coal | 86.6 | 75.1 | 55.2 | 55.7 | 30.8 | 43.1 | 64.3 | 67.1 | 43.9 | 77.8 | 74.4 | 94.7 | 768.7 |
| | Oil | 1.6 | 1/ | 1/ | 0.0 | 1/ | 1/ | 1/ | 1/ | 1/ | 0.9 | 0.2 | 14.6 | 17.5 |
| | Gas | 83.1 | 54.0 | 64.0 | 40.9 | 49.1 | 74.4 | 100.1 | 95.2 | 50.8 | 91.7 | 224.7 | 289.4 | 1,217.4 |
| 1973 | Coal | 85.6 | 69.0 | 76.3 | 92.1 | 94.3 | 26.0 | 50.9 | 91.6 | 53.0 | 74.7 | 87.6 | 91.5 | 892.6 |
| | Oil | 1.8 | 0.2 | 0.1 | 9.2 | 24.8 | 0.4 | 8.1 | 18.4 | 0.2 | 50.1 | 38.8 | 0.1 | 152.2 |
| | Gas | 326.3 | 233.7 | 198.4 | 185.3 | 177.8 | 99.8 | 0.0 | 191.0 | 166.0 | 271.8 | 178.0 | 139.3 | 2,167.4 |
| 1974 | Coal | 79.8 | 78.3 | 73.6 | 65.1 | 61.2 | 18.8 | 63.4 | 72.9 | 77.5 | 83.7 | 89.5 | 90.8 | 854.6 |
| | Oil | 10.6 | 1/ | 1/ | 1/ | 0.3 | 1/ | 1/ | 1/ | 1/ | 1/ | 1/ | 2.9 | 14.0 |
| | Gas | 206.6 | 92.8 | 109.6 | 106.7 | 69.8 | 54.7 | 7.2 | 51.5 | 55.5 | 111.8 | 82.8 | 89.0 | 1,038.0 |
| 1975 | Coal | 83.2 | 78.7 | 88.3 | 88.8 | 76.4 | 47.3 | 61.8 | 70.8 | 59.3 | 84.5 | 145.8 | 176.3 | 1,061.3 |
| | Oil | 1.9 | 1/ | 1/ | 1/ | 0.1 | 1/ | 1/ | 1/ | 14.2 | 17.8 | 10.1 | 18.3 | 62.6 |
| | Gas | 148.0 | 113.5 | 90.5 | 51.4 | 50.0 | 64.0 | 171.3 | 104.9 | 105.0 | 56.6 | 47.6 | 70.6 | 1,073.3 |
| 1976 | Coal | 193.1 | 175.6 | 179.8 | 140.8 | 91.8 | 94.6 | 145.7 | 146.8 | 268.2 | 326.1 | 287.9 | 323.1 | 2,373.5 |
| | Oil | 6.3 | 6.2 | 5.2 | 6.3 | 1.0 | 7.6 | 11.2 | 10.2 | 5.4 | 7.3 | 9.4 | 4.5 | 80.6 |
| | Gas | 58.7 | 47.5 | 51.5 | 39.2 | 28.5 | 43.6 | 70.4 | 70.4 | 49.8 | 113.3 | 61.1 | 74.5 | 708.5 |

1/ less than 0.1

Source: Federal Energy Regulatory Commission (formerly Federal Power Commission), Form 4 News Releases

Table 2.7

Industrial Consumption of Electricity
in Montana in 1975 and 1976, by SIC Code

| Industry | SIC Code | 1975 (000 KWH) | 1975 % of Total | 1976 (000 KWH) | 1976 % of Total | % Change 76/75 |
|---|---|---|---|---|---|---|
| Metal, Bituminous Coal, Lignite Mining | 10 & 12* | 314,739 | 6.7 | 285,611 | 5.3 | -9.3 |
| Crude Petroleum, Natural Gas | 13 | 199,191 | 4.2 | 194,452 | 3.6 | -2.4 |
| Nonmetallic Mineral Mining | 14 | 54,095 | 1.1 | 44,872 | 0.8 | -17.0 |
| TOTAL MINING | | 568,025 | 12.0 | 524,935 | 9.8 | - 7.6 |
| Lumber and Wood Products | 24 | 250,198 | 5.3 | 292,440 | 5.5 | +16.9 |
| Stone, Clay, Glass, Concrete | 32 | 64,495 | 1.4 | 90,552 | 1.7 | +40.0 |
| Primary Metals | 33 | 2,942,515 | 62.2 | 3,446,846 | 64.4 | +17.1 |
| Fabricated Metals | 34 | 1,026 | 0.02 | 1,132 | 0.02 | +10.3 |
| Machinery (Nonelectric) | 35 | 858 | 0.02 | 887 | 0.02 | - 3.4 |
| Transportation Equipment | 37 | 1,582 | 0.03 | 1,120 | 0.02 | -29.2 |
| TOTAL DURABLE GOODS | | 3,259,674 | 69.0 | 3,832,977 | 71.6 | +17.6 |
| Food and Kindred Products | 20 | 63,864 | 1.4 | 64,755 | 1.2 | + 1.4 |
| Paper and Allied Products | 26 | 104,152 | 2.2 | 175,516 | 3.3 | +68.5 |
| Printing and Publishing | 27 | 6,794 | 0.1 | 6,977 | 0.1 | + 2.7 |
| Chemical Products | 28 | 404,943 | 8.6 | 456,759 | 8.5 | +12.8 |
| Petroleum Products | 29 | 317,888 | 6.7 | 289,415 | 5.4 | - 9.0 |
| TOTAL NONDURABLE GOODS | | 897,640 | 19.0 | 993,422 | 18.6 | +10.7 |
| TOTAL MANUFACTURING | | 4,157,314 | | 4,826,399 | 90.2 | +16.1 |
| GRAND TOTAL | | 4,725,339 | 100.0 | 5,351,334 | 100.0 | + 4.5 |

*SIC Codes 10 and 12 combined because less than 3 firms reported for each in 1976

Source: Research Department, Federal Reserve Bank, Minneapolis, Minnesota

# III

# COAL

## HIGHLIGHTS

- Montana coal production in 1976 totaled 26,285,731 tons according to Department of Revenue figures -- up 19 percent from the previous year.

- Big Horn County was the top coal producer with 14,291,542 tons. Rosebud was a close second with a total production of 11,662,052 tons of coal in 1976.

- The average minemouth price for Montana coal in 1976 was $5.72 per ton compared with $4.97 per ton in 1975.

- About 90 percent of Montana's 1976 coal production was shipped out-of-state.

- Montana's 1977 production reached a record 27.4 million tons, which is up 4 percent from 1976.

Table 3.1

Total Estimated Remaining Identified Resources
Of Coal and Lignite
By State, January 1, 1974[a]
(Billions of short tons)

| State | Total Coal and Lignite | Anthracite and Semianthracite | Sub-bituminuous | Bituminous | Lignite |
|---|---|---|---|---|---|
| United States | 1,730.9 | 19.7 | 485.8 | 747.3 | 478.1 |
| Alabama | 15.3 | | | 13.3 | 2.0 |
| Alaska | 130.1 | | 110.7 | 19.4 | |
| Arizona | 21.2 | | | 21.2 | |
| Arkansas | 2.4 | 0.4 | | 1.6 | 0.4 |
| Colorado | 128.9 | 0.1 | 19.7 | 109.1 | b |
| Georgia | b | | | b | |
| Illinois | 146.0 | | | 146.0 | |
| Indiana | 32.9 | | | 32.9 | |
| Iowa | 6.5 | | | 6.5 | |
| Kansas | 18.7 | | | 18.7 | |
| Kentucky | 64.3 | | | 64.3 | |
| Maryland | 1.2 | | | 1.2 | |
| Michigan | 0.2 | | | 0.2 | |
| Missouri | 31.2 | | | 31.2 | |
| Montana | 291.6 | | 176.8 | 2.3 | 112.5 |
| New Mexico | 61.4 | b | 50.6 | 10.7 | |
| North Carolina | 0.1 | | | 0.1 | |
| North Dakota | 350.6 | | | | 350.6 |
| Ohio | 41.2 | | | 41.2 | |
| Oklahoma | 7.1 | | | 7.1 | |
| Oregon | 0.3 | | 0.3 | b | |
| Pennsylvania | 82.8 | 18.8 | | 63.9 | |
| South Dakota | 2,2 | | | | 2.2 |
| Tennessee | 2.5 | | | 2.5 | |
| Texas | 16.3 | | | 6.0 | 10.3 |
| Utah | 23.4 | | 0.2 | 23.2 | |
| Virginia | 9.6 | 0.3 | | 9.2 | |
| Washington | 6.2 | b | 4.2 | 1.9 | 0.1 |
| West Virginia | 100.1 | | | 100.1 | |
| Wyoming | 135.9 | | 123.2 | 12.7 | |
| Other States | 0.7[c] | | b,d | 0.6[e] | b,f |

a. Figures are for resources in the ground, about half of which may be considered recoverable. Includes beds of bituminous coal and anthracite 14 in. or more thick and beds of subbituminous coal and lignite 2 1/2 feet or more thick.
b. Less than 50 million short tons.
c. Includes California, Idaho, Louisiana, Mississippi, Nebraska and Nevada.
d. Includes California and Idaho.
e. Includes California, Idaho, Nebraska and Nevada.
f. Includes California, Idaho, Mississippi and Nevada.

Source: Paul Averitt, U.S. Dept. of the Interior, Coal Resources of the United States, January 1, 1974 (Bulletin 1412).

Table 3.2

Montana Coal Production, By Mine, By Month, 1977

| Month | Divide | Decker | Peabody | Westmore-land | Knife River | Western Energy | PM | Coal Creek Strip | Monthly Total |
|---|---|---|---|---|---|---|---|---|---|
| Jan. | 1,160 | 941,321 | 184,834 | 187,850 | 27,090 | 752,035 | 1,484 | 1,389 | 2,097,163 |
| Feb. | 819 | 739,819 | 172,371 | 201,832 | 23,182 | 673,879 | 769 | 428 | 1,813,099 |
| Mar. | 545 | 792,038 | 247,303 | 453,638 | 32,982 | 819,028 | 652 | 507 | 2,346,693 |
| April | 191 | 1,019,537 | 236,198 | 512,543 | 25,661 | 860,579 | 208 | 287 | 2,655,204 |
| May | 114 | 801,513 | 239,087 | 454,378 | 24,012 | 820,912 | none | 1,504 | 2,341,520 |
| June | none | 805,674 | 235,701 | 411,425 | 13,440 | 864,548 | none | 3,104 | 2,333,892 |
| July | none | 1,191,510 | 188,289 | 342,183 | 25,915 | 911,301 | none | 2,110 | 2,661,308 |
| Aug. | none | 819,034 | 154,338 | 470,593 | 20,264 | 792,374 | none | 62 | 2,256,665 |
| Sept. | 602 | 725,367 | 184,523 | 439,311 | 27,283 | 910,191 | 650 | 613 | 2,288,545 |
| Oct. | 757 | 753,502 | 222,714 | 405,078 | 27,876 | 811,804 | 1,229 | 808 | 2,223,768 |
| Nov. | 1,480 | 744,400 | 166,767 | 377,168 | 22,620 | 802,727 | 1,610 | 3,221 | 2,119,993 |
| Dec. | 1,382 | 1,056,704 | 80,209 | 273,059 | 32,096 | 808,083 | 2,075 | 1,981 | 2,255,589 |
| Totals | 7,050 | 10,390,419 | 2,312,334 | 4,529,058 | 302,426 | 9,827,361 | 8,677 | 16,014 | 27,393,439 |

Source: Montana Energy Office

Table 3.3

Montana Coal Production, By County
(tons)

| Year | Big Horn | Carbon | Cascade | Custer | Dawson | Fallon | Garfield | McCone |
|---|---|---|---|---|---|---|---|---|
| 1950 | | 198,781 | 21,306 | 5,618 | 7,657 | | 563 | 1,646 |
| 1951 | | 152,095 | 18,106 | 2,447 | 7,657 | 93 | 500 | |
| 1952 | | 122,771 | 2,278 | 1,441 | 6,326 | | 413 | |
| 1953 | | 56,942 | 1,086 | 940 | 4,579 | | | |
| 1954 | | 19,716 | 2,225 | 1,080 | 3,006 | | | 59 |
| 1955 | | 20,017 | 1,252 | 233 | 3,780 | | | |
| 1956 | | 17,025 | 2,132 | | 1,819 | | | 25 |
| 1957 | | 15,053 | 2,095 | | 2,734 | | | 965 |
| 1958 | | 10,906 | 1,816 | | 2,393 | | | 513 |
| 1959 | | 12,814 | 1,923 | | 2,502 | | | 279 |
| 1960 | | 11,085 | 1,650 | | 1,920 | | | 366 |
| 1961 | | 9,962 | 1,477 | | 1,313 | | | 1,091 |
| 1962 | | 11,363 | 1,444 | | 1,242 | | | 468 |
| 1963 | | 12,514 | 570 | | 1,477 | | | 335 |
| 1964 | | 12,023 | | | 987 | | | 316 |
| 1965 | | 25,684 | | | 1,217 | | | 142 |
| 1966 | | 52,811 | | | 767 | | | 254 |
| 1967 | | | | | 770 | | | 196 |
| 1968 | | | | | 266 | | | 163 |
| 1969 | | | | | 160 | | | 165 |
| 1970 | 74,856 | | | | 744 | | | 229 |
| 1971 | | | | | 127 | | | |
| 1972 | 792,949 | | | | 340 | | | |
| 1973 | 4,159,287 | | | | 242 | | | |
| 1974 | 8,332,038 | | | | 373 | | | |
| 1975 | 13,331,433 | | | | | | | |
| 1976 | 14,291,542 | | | | | | | |

Source: Montana Department of Revenue

Table 3.3 (Continued)

| Year | Mussel-shell | Powder River | Prairie | Richland | Rosebud | Sheridan | Valley | State Total |
|---|---|---|---|---|---|---|---|---|
| 1950 | 523,582 | 3,838 | 851 | 12,072 | 1,708,869 | 8,882 | 156 | 2,493,821 |
| 1951 | 593,030 | 3,772 | 1,950 | 12,956 | 1,488,300 | | 329 | 2,281,235 |
| 1952 | 502,533 | 2,573 | 1,213 | 14,589 | 1,406,321 | 6,862 | 99 | 2,067,419 |
| 1953 | 370,745 | 1,273 | 900 | 10,478 | 1,421,140 | | | 1,868,083 |
| 1954 | 345,474 | 2,160 | 213 | 10,156 | 1,083,311 | 7,406 | | 1,474,806 |
| 1955 | 366,086 | | | 1,444 | 795,955 | 7,541 | | 1,196,308 |
| 1956 | 347,126 | 1,858 | 336 | 5,420 | 952,080 | 6,601 | | 1,334,422 |
| 1957 | 199,652 | 2,557 | 614 | 1,527 | 164,311 | 5,195 | | 394,703 |
| 1958 | 220,606 | 4,711 | 307 | 76,218 | 19,241 | 2,125 | | 338,836 |
| 1959 | 135,117 | 1,517 | 313 | 177,972 | | 5,429 | | 337,866 |
| 1960 | 91,819 | 820 | | 188,820 | | 4,793 | | 301,273 |
| 1961 | 75,060 | 1,760 | | 264,108 | | 4,077 | | 358,848 |
| 1962 | 48,565 | 2,080 | | 297,013 | | 3,675 | | 365,850 |
| 1963 | 31,044 | 2,258 | | 285,697 | | 2,653 | | 336,548 |
| 1964 | 31,836 | 2,535 | | 294,463 | | 2,476 | | 344,636 |
| 1965 | 47,592 | 2,107 | | 298,315 | | 2,191 | | 377,248 |
| 1966 | 32,752 | 1,787 | | 325,348 | | 1,691 | | 415,410 |
| 1967 | 33,481 | 2,128 | | 326,757 | | 1,177 | | 364,509 |
| 1968 | 31,637 | 1,853 | | 329,022 | 192,029 | 301 | | 555,271 |
| 1969 | 30,540 | 2,047 | | 306,833 | 685,140 | | | 1,024,885 |
| 1970 | 26,675 | 3,053 | | 321,908 | 3,089,693 | | | 3,517,158 |
| 1971 | 112,252 | 2,660 | | 325,475 | 6,656,612 | | | 7,097,126 |
| 1972 | 46,460 | 1,727 | | 320,975 | 7,101,954 | | | 8,264,405 |
| 1973 | 29,837 | 1,444 | | 312,785 | 6,225,424 | | | 10,729,019 |
| 1974 | 20,669 | 1,001 | | 329,590 | 5,440,384 | | | 14,124,055 |
| 1975 | 16,524 | 1,862 | | 300,053 | 8,511,226 | | | 22,161,098 |
| 1976 | 15,709 | 1,614 | | 314,814 | 11,662,052 | | | 26,285,731 |

Source: Montana Department of Revenue

Table 3.4

Montana Coal Production and Average
Minemouth Prices by Type of Coal

| Year | Production (1000 Tons) | | | Average Minemouth Price ($/Ton) | | |
|---|---|---|---|---|---|---|
| | Bituminous | Lignite | Total | Bituminous | Lignite | Total |
| 1950 | 2,468 | 52 | 2,520 | 2.30 | 3.37 | 2.33 |
| 1951 | 2,310 | 35 | 2,345 | 2.61 | 3.51 | 2.63 |
| 1952 | 2,039 | 31 | 2,070 | 2.80 | 3.70 | 2.81 |
| 1953 | 1,848 | 25 | 1,873 | 2.64 | 3.77 | 2.66 |
| 1954 | 1,491 | NA | NA | 2.79 | NA | NA |
| 1955 | 1,217 | 30 | 1,247 | 3.01 | 3.82 | 3.03 |
| 1956 | 820 | 26 | 846 | 4.11 | 3.70 | 4.10 |
| 1957 | 387 | 26 | 413 | 5.33 | 3.80 | 5.23 |
| 1958 | 211 | 94 | 305 | 5.94 | 2.34 | 4.84 |
| 1959 | 152 | 193 | 345 | 7.06 | 2.08 | 4.28 |
| 1960 | 113 | 200 | 313 | 6.87 | 2.06 | 3.79 |
| 1961 | 97 | 274 | 371 | 6.76 | 2.01 | 3.26 |
| 1962 | 78 | 304 | 382 | 6.90 | 1.99 | 2.98 |
| 1963 | 53 | 290 | 343 | 7.51 | 1.95 | 2.82 |
| 1964 | 46 | 300 | 346 | 7.40 | 1.95 | 2.68 |
| 1965 | 63 | 301 | 364 | 7.24 | 1.96 | 2.88 |
| 1966 | 91 | 328 | 419 | 7.10 | 1.96 | 3.08 |
| 1967 | 65 | 300 | 365 | NA | NA | NA |
| 1968 | 189 | 330 | 519 | 3.12 | 1.89 | 2.33 |
| 1969 | 722 | 308 | 1,030 | 2.18 | 2.03 | 2.13 |
| 1970 | 3,124 | 323 | 3,447 | 1.83 | 2.13 | 1.86 |
| 1971 | 6,737 | 327 | 7,064 | 1.79 | 2.27 | 1.82 |
| 1972 | 7,899 | 322 | 8,221 | 2.01 | 2.45 | 2.02 |
| 1973 | 10,411 | 314 | 10,725 | 2.83 | 2.60 | 2.82 |
| 1974 | 13,775 | 331 | 14,106 | 3.91 | 3.00 | 3.90 |
| 1975 | 21,620 | 520 | 22,140 | 5.06 | 5.04 | 5.06 |
| 1976 | 25,919 | 312 | 26,231 | NA | NA | 4.90 |

Source: United States Bureau of Mines

Table 3.5

SUMMARY OF COAL RECEIPTS FROM MONTANA AND WYOMING BY ELECTRIC UTILITY PLANTS
(1000 short tons)

| YEAR | MONTANA COAL | | | WYOMING COAL | | |
|---|---|---|---|---|---|---|
| | TOTAL RECEIPTS BY ALL PLANTS | TOTAL IN-STATE RECEIPTS | TOTAL OUT-OF-STATE RECEIPTS | TOTAL RECEIPTS BY ALL PLANTS | TOTAL IN-STATE RECEIPTS | TOTAL OUT-OF-STATE RECEIPTS |
| 1972[1/] | 4,722 | 336 | 4,386 | 5,550 | 2,874 | 2,676 |
| 1973 | 10,623 | 882 | 9,741 | 13,123 | 5,670 | 7,453 |
| 1974 | 13,936 | 822 | 13,114 | 17,879 | 5,792 | 12,087 |
| 1975 | 21,377 | 1,197 | 20,180 | 21,591 | 7,235 | 14,356 |
| 1976 | 24,958 | 2,316 | 22,642 | 25,781 | 7,711 | 18,070 |
| 1977[2/] | 12,035 | 1,409 | 10,626 | 17,983 | 4,377 | 13,606 |

1/ For six months from July 1, 1972 to December 31, 1972

2/ For six months from January 1, 1977 to June 30, 1977

Source: Federal Power Commission Form 423

Table 3.6

Average Minemouth Coal Prices in Montana, by County
($/Ton)

| Year | Big Horn | Carbon | Cascade | Custer | Dawson | Fallon | Garfield | McCone |
|---|---|---|---|---|---|---|---|---|
| 1950 | | 4.77 | 6.47 | 3.23 | 3.00 | | 3.00 | 2.04 |
| 1951 | | 5.00 | 1.43 | 3.00 | 2.48 | 2.00 | 2.00 | |
| 1952 | | 5.04 | 9.59 | 3.95 | 2.00 | | 2.00 | |
| 1953 | | 5.47 | 10.90 | 4.00 | 2.00 | | | |
| 1954 | | 7.48 | 6.80 | 4.13 | 3.00 | | | 3.00 |
| 1955 | | 3.50 | 8.06 | 1.00 | 1.00 | | | |
| 1956 | | 7.25 | 6.90 | | 1.10 | | | 1.12 |
| 1957 | | 7.50 | 7.30 | | 1.00 | | | 1.00 |
| 1958 | | 7.56 | 7.75 | | 1.00 | | | 1.00 |
| 1959 | | 7.53 | 7.55 | | 1.00 | | | 1.00 |
| 1960 | | 7.45 | 7.67 | | 1.00 | | | 1.00 |
| 1961 | | 7.66 | 7.82 | | 1.00 | | | 2.16 |
| 1962 | | 7.69 | 7.79 | | 1.00 | | | 3.59 |
| 1963 | | 8.08 | 7.74 | | 1.00 | | | 1.88 |
| 1964 | | 8.26 | | | 1.00 | | | 1.75 |
| 1965 | | 6.76 | | | 1.00 | | | 4.00 |
| 1966 | | 6.49 | | | 1.00 | | | 3.08 |
| 1967 | | | | | 1.00 | | | 3.51 |
| 1968 | | | | | 1.00 | | | 4.96 |
| 1969 | | | | | 1.00 | | | 1.00 |
| 1970 | 4.62 | | | | 1.00 | | | 3.57 |
| 1971 | | | | | 1.00 | | | |
| 1972 | 3.47 | | | | 1.00 | | | |
| 1973 | 3.93 | | | | 1.00 | | | |
| 1974 | 4.53 | | | | 1.00 | | | |
| 1975 | 5.68 | | | | | | | |
| 1976 | 6.69 | | | | | | | |

Table 3.6 (Continued)

| Year | Mussel-shell | Powder River | Prairie | Richland | Rosebud | Sheridan | Valley | State Average |
|---|---|---|---|---|---|---|---|---|
| 1950 | 4.50 | 2.00 | 2.00 | 3.52 | 1.32 | 3.00 | 3.00 | 2.34 |
| 1951 | 4.14 | 2.00 | 2.00 | 3.39 | 1.65 | | 3.50 | 2.54 |
| 1952 | 4.35 | 2.00 | 2.00 | 2.49 | 1.98 | 3.30 | 3.50 | 2.76 |
| 1953 | 4.75 | 3.00 | 3.00 | 3.80 | 2.00 | | | 2.66 |
| 1954 | 4.25 | 3.00 | 3.00 | 4.09 | 2.00 | 3.50 | | 2.62 |
| 1955 | 4.60 | | | 3.00 | 2.00 | 3.55 | | 2.83 |
| 1956 | 4.95 | 1.10 | 1.10 | 4.30 | 1.95 | 3.56 | | 2.83 |
| 1957 | 5.38 | 1.00 | 1.00 | 4.33 | 2.95 | 3.58 | | 4.35 |
| 1958 | 4.03 | 1.00 | 1.00 | 1.96 | 2.83 | 5.57 | | 3.55 |
| 1959 | 5.44 | 1.00 | 1.00 | 1.93 | | 3.80 | | 3.59 |
| 1960 | 6.40 | 1.00 | | 1.94 | | 3.80 | | 3.56 |
| 1961 | 6.32 | 1.00 | | 1.93 | | 3.93 | | 3.04 |
| 1962 | 4.24 | 1.00 | | 1.92 | | 4.00 | | 2.45 |
| 1963 | 6.29 | 1.00 | | 1.92 | | 4.00 | | 2.57 |
| 1964 | 6.58 | 1.00 | | 1.92 | | 4.00 | | 2.58 |
| 1965 | 6.47 | 1.00 | | 1.93 | | 4.32 | | 2.83 |
| 1966 | 6.98 | 1.00 | | 1.94 | | 4.31 | | 2.91 |
| 1967 | 7.07 | 1.00 | | 1.95 | | 4.50 | | 2.42 |
| 1968 | 7.58 | 1.00 | | 1.95 | 1.63 | 4.50 | | 2.15 |
| 1969 | 8.08 | 1.00 | | 2.02 | 1.81 | | | 2.07 |
| 1970 | 6.73 | 1.00 | | 2.12 | 1.68 | | | 1.82 |
| 1971 | 4.29 | 1.00 | | 2.25 | 1.73 | | | 1.79 |
| 1972 | 5.41 | 6.00 | | 2.43 | 1.83 | | | 2.03 |
| 1973 | 9.31 | 7.13 | | 2.58 | 2.06 | | | 2.83 |
| 1974 | 6.62 | 9.41 | | 3.39 | 2.80 | | | 3.84 |
| 1975 | 10.00 | 10.00 | | 5.02 | 3.85 | | | 4.97 |
| 1976 | 18.31 | 9.74 | | 6.35 | 4.49 | | | 5.72 |

Source: Montana Department of Revenue

Table 3.7

Distribution of Coal Produced in Montana, Wyoming, and North Dakota in 1975 and 1976, by State of Destination (thousand tons)

| State of Destination | Montana | | Wyoming | | North and South Dakota | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 1976 | 1975 | 1976 | 1975 | 1976 | 1975 | 1976 | 1975 |
| Ohio | -- | -- | 2,170 | 927 | -- | -- | 2,170 | 927 |
| Kentucky | 42 | 170 | -- | -- | -- | -- | 42 | 170 |
| Illinois | 8,759 | 9,466 | 1,728 | 2,054 | -- | -- | 10,487 | 11,520 |
| Indiana | 1,243 | 840 | 2,528 | 3,019 | 7 | -- | 3,778 | 3,859 |
| Michigan | 2,887 | 1,265 | -- | 3 | -- | -- | 2,887 | 1,268 |
| Minnesota | 8,115 | 6,254 | 29 | 60 | 1,161 | 1,116 | 9,305 | 7,430 |
| Wisconsin | 2,584 | 2,464 | 985 | 1,103 | -- | -- | 3,569 | 3,567 |
| Iowa | 329 | 372 | 3,227 | 1,918 | 13 | -- | 3,569 | 2,290 |
| Kansas | -- | -- | 1,150 | 1,254 | -- | -- | 1,150 | 1,254 |
| Missouri | -- | -- | 1,062 | 1,006 | -- | -- | 1,062 | 1,006 |
| Nebraska | -- | -- | 2,044 | 1,361 | -- | -- | 2,044 | 1,361 |
| Texas | -- | -- | 1,411 | 136 | -- | -- | 1,411 | 136 |
| Idaho | -- | -- | 448 | 290 | -- | -- | 448 | 290 |
| Montana | 2,452 | 1,206 | 73 | 9 | -- | -- | 2,525 | 1,215 |
| North Dakota | 1 | 121 | 6 | 5 | 7,488 | 5,521 | 7,495 | 5,647 |
| South Dakota | 3 | 57 | 410 | 352 | 2,422 | 1,778 | 2,835 | 2,187 |
| Wyoming | -- | -- | 9,780 | 7,855 | -- | -- | 9,780 | 7,855 |
| Colorado | -- | -- | 3,099 | 2,240 | -- | -- | 3,099 | 2,240 |
| Utah | -- | -- | 29 | 14 | -- | -- | 29 | 14 |
| California | -- | -- | 1 | 24 | -- | -- | 1 | 24 |
| Oregon | -- | -- | 224 | 64 | -- | -- | 224 | 64 |
| Washington | -- | -- | 138 | 16 | -- | -- | 138 | 16 |
| Total All States | 26,415 | 22,214 | 30,542 | 23,710 | 11,091 | 8,415 | 68,048 | 54,340 |
| Percent of Total | 38.8 | 41.0 | 44.9 | 43.5 | 16.3 | 15.5 | 100.0 | 100.0 |

Source: U.S. Bureau of Mines, "Bituminous Coal and Lignite Distribution Calendar Year 1976," Mineral Industry Surveys, pages 12-41.

Table 3.8

Distribution of Coal in Montana
(1000 Short Tons)

| Year | Total | Electric Utility | Retail Dealers | Other Usage |
|---|---|---|---|---|
| 1974 | 907 | 843 | 9 | 55 |
| 1975 | 1,252 | 1,203 | 7 | 42 |
| 1976 | 2,565 | 2,452 | 5 | 108 |

Source: U.S. Bureau of Mines, "Bituminous Coal and Lignite Distribution Calendar Year 1976," Mineral Industry Surveys, page 50.

# IV

# NATURAL GAS

## HIGHLIGHTS

- Montana's estimated natural gas reserves as of December 31, 1976, was 1.096 trillion cubic feet -- an increase of 18 percent from a year earlier.

- Natural gas production in Montana totaled 45,098,000,000 cubic feet in 1976 -- up 1 percent from the previous year.

- Sales of natural gas in Montana during 1976 totaled 70.4 billion cubic feet -- a drop of 10 percent from 1975.

Table 4.1

Natural Gas Proved Reserves in Montana
1950-1976 (million cubic feet)

| Year | Non-Associated | Associated/Dissolved | Underground Storage | Total Gas |
|---|---|---|---|---|
| 1950 | 718,722 | 69,839 | 4,470 | 793,031 |
| 1951 | 696,554 | 119,533 | 7,522 | 823,609 |
| 1952 | 693,916 | 119,631 | 9,562 | 823,109 |
| 1953 | 612,965 | 117,937 | 28,949 | 759,851 |
| 1954 | 573,496 | 116,183 | 30,122 | 719,801 |
| 1955 | 560,565 | 125,067 | 30,178 | 715,810 |
| 1956 | 546,049 | 115,906 | 30,614 | 692,569 |
| 1957 | 512,583 | 119,311 | 34,914 | 666,808 |
| 1958 | 508,851 | 132,295 | 37,163 | 678,309 |
| 1959 | 492,162 | 128,880 | 40,835 | 661,877 |
| 1960 | 462,532 | 105,362 | 54,883 | 622,777 |
| 1961 | 435,178 | 104,319 | 53,601 | 593,098 |
| 1962 | 419,128 | 98,958 | 82,085 | 600,171 |
| 1963 | 399,266 | 103,558 | 95,307 | 598,131 |
| 1964 | 384,278 | 99,287 | 106,704 | 590,269 |
| 1965 | 373,440 | 103,672 | 118,740 | 595,852 |
| 1966 | 383,346 | 102,239 | 134,765 | 620,350 |
| 1967 | 550,681 | 138,454 | 148,583 | 837,718 |
| 1968 | 579,572 | 174,266 | 157,695 | 911,533 |
| 1969 | 799,770 | 147,927 | 162,511 | 1,110,208 |
| 1970 | 793,283 | 141,854 | 164,786 | 1,099,923 |
| 1971 | 715,195 | 127,032 | 182,334 | 1,024,561 |
| 1972 | 790,660 | 92,628 | 180,748 | 1,064,036 |
| 1973 | 821,513 | 85,625 | 185,311 | 1,092,449 |
| 1974 | 676,749 | 81,272 | 143,239 | 901,260 |
| 1975 | 686,350 | 73,912 | 169,724 | 929,986 |
| 1976 | 876,452 | 67,435 | 162,383 | 1,106,270 |

Source: American Gas Association, Gas Facts

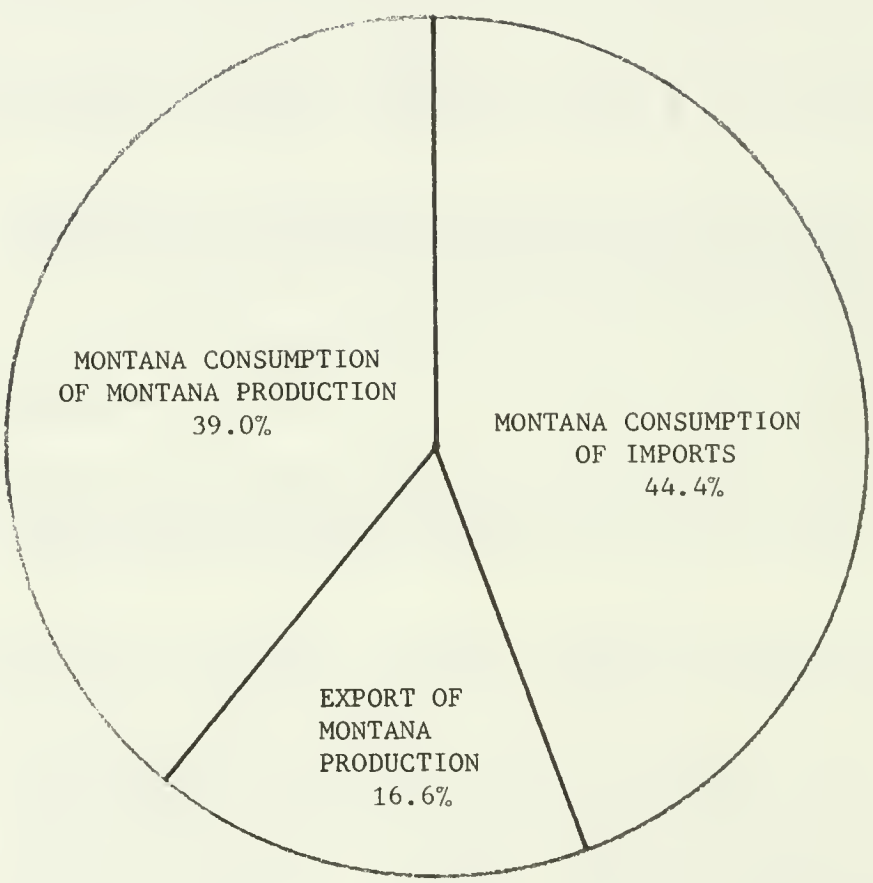
Table 4.2

Production, Average Wellhead Prices and
Distribution of Natural Gas in Montana

| Year | Production[1] (MMCF) | Production[2] (MMCF) | Average Wellhead[2] Price (cents/MCF) | Natural Gas[2,3,4] Distributed (MMCF) |
|---|---|---|---|---|
| 1950 | 39708 | 39010 | 5.0 | 29616 |
| 1951 | 39038 | 36123 | 5.3 | 31448 |
| 1952 | 30409 | 27939 | 5.7 | 34742 |
| 1953 | 31779 | 28592 | 6.3 | 34365 |
| 1954 | 31150 | 29765 | 6.0 | 35070 |
| 1955 | 30468 | 30227 | 5.2 | 36409 |
| 1956 | 29356 | 28350 | 6.1 | 41121 |
| 1957 | 32979 | 31413 | 6.0 | 41421 |
| 1958 | 31327 | 27689 | 6.5 | 31947 |
| 1959 | 31585 | 30551 | 6.0 | 44471 |
| 1960 | 35381 | 30411 | 6.8 | 43490 |
| 1961 | 34884 | 32407 | 6.4 | 46072 |
| 1962 | 28973 | 29417 | 6.1 | 50534 |
| 1963 | 27113 | 25504 | 6.6 | 49694 |
| 1964 | 25234 | 23592 | 6.6 | 53323 |
| 1965 | 27873 | 26285 | 6.5 | 58791 |
| 1966 | 32414 | 29041 | 8.1 | 60953 |
| 1967 | 31619 | 29276 | 7.9 | 60560 |
| 1968 | 31917 | 28831 | 8.8 | 57249 |
| 1969 | 41229 | 37804 | 7.2 | 66856 |
| 1970 | 37445 | 35225 | 8.1 | 67252 |
| 1971 | 38137 | 28775 | 8.2 | 74236 |
| 1972 | 35606 | 32171 | 10.0 | 72831 |
| 1973 | 58896 | 56383 | 15.9 | 73197 |
| 1974 | 51401 | 41753 | 25.2 | 72184 |
| 1975 | 44546 | 41664 | 39.4 | 17479 |
| 1976 | 45098 | 42499 | 44.0 | 43997 |

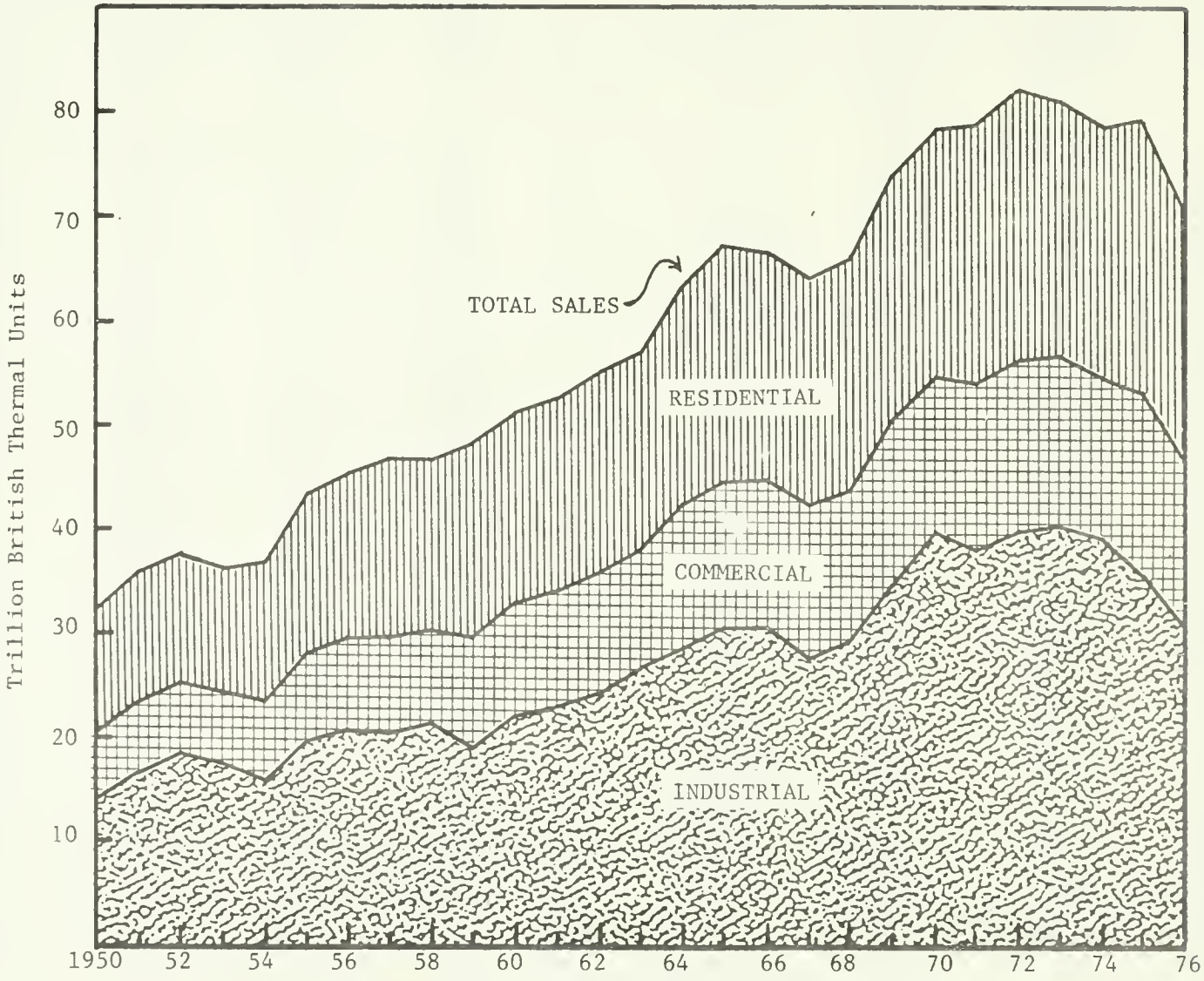
[1] Source: Montana Oil and Gas Conservation Division
[2] Source: Montana Department of Revenue
[3] Data is for fiscal year ending June 30 of year shown
[4] Beginning in 1975, the distributors' tax was changed to a severance tax at the wellhead

Figure 4.1




Supply of Natural Gas in Montana, 1976

Figure 4.2




Sales of Natural Gas in Montana, By Consuming Sector
(In Trillion British Thermal Units)

Table 4.3

Sales and Average Prices of Natural Gas
in Montana

| Year | Sales (trillion BTU) | | | | | Average Price (cents/million BTU) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Residential | Commercial | Industrial | Other | Total | Residential | Commercial | Industrial | Other |
| 1950 | 32.7 | 12.3 | 5.9 | 12.9 | 1.7 | 31.0 | 36.9 | 27.0 | 30.3 | 5.9 |
| 1951 | 35.9 | 12.5 | 6.7 | 15.0 | 1.7 | 32.3 | 49.7 | 35.8 | 17.2 | 22.9 |
| 1952 | 37.7 | 12.3 | 7.1 | 15.4 | 2.9 | 34.1 | 51.6 | 37.0 | 21.4 | 20.5 |
| 1953 | 36.3 | 12.1 | 7.0 | 15.5 | 1.7 | 35.2 | 52.7 | 37.8 | 21.6 | 23.9 |
| 1954 | 36.9 | 13.4 | 7.7 | 14.1 | 1.7 | 36.8 | 52.6 | 38.7 | 22.3 | 24.2 |
| 1955 | 43.5 | 15.4 | 8.7 | 17.6 | 1.8 | 36.1 | 52.0 | 38.3 | 22.4 | 24.1 |
| 1956 | 45.4 | 15.8 | 9.0 | 18.8 | 1.8 | 35.1 | 51.0 | 37.7 | 21.8 | 24.2 |
| 1957 | 46.9 | 17.0 | 9.6 | 18.4 | 1.9 | 40.2 | 57.4 | 41.8 | 25.0 | 24.9 |
| 1958 | 46.6 | 16.3 | 9.1 | 19.3 | 1.9 | 41.4 | 59.1 | 43.1 | 27.0 | 27.0 |
| 1959 | 48.5 | 18.9 | 10.8 | 16.6 | 2.2 | 43.3 | 58.9 | 43.5 | 27.6 | 27.6 |
| 1960 | 51.3 | 18.5 | 11.0 | 19.8 | 2.0 | 43.2 | 60.1 | 45.2 | 27.6 | 29.2 |
| 1961 | 53.1 | 18.7 | 11.5 | 20.8 | 2.1 | 42.7 | 59.8 | 44.5 | 27.9 | 26.9 |
| 1962 | 55.5 | 19.4 | 12.0 | 21.9 | 2.2 | 46.1 | 65.7 | 47.1 | 29.8 | 30.1 |
| 1963 | 57.3 | 19.0 | 11.7 | 24.4 | 2.2 | 47.6 | 68.9 | 49.6 | 31.6 | 33.0 |
| 1964 | 63.3 | 21.1 | 13.2 | 26.6 | 2.4 | 47.5 | 68.2 | 49.2 | 31.6 | 32.8 |
| 1965 | 67.4 | 22.6 | 14.4 | 28.0 | 2.5 | 47.4 | 68.1 | 49.3 | 31.1 | 32.1 |
| 1966 | 66.9 | 22.0 | 14.2 | 28.2 | 2.5 | 48.0 | 69.4 | 50.2 | 31.6 | 33.1 |
| 1967 | 64.4 | 21.9 | 14.7 | 25.3 | 2.6 | 50.9 | 71.7 | 51.9 | 34.0 | 33.1 |
| 1968 | 66.2 | 22.4 | 14.6 | 26.6 | 2.7 | 52.3 | 75.4 | 55.7 | 33.0 | 32.9 |
| 1969 | 74.1 | 23.7 | 15.5 | 32.2 | 2.7 | 53.7 | 79.9 | 59.0 | 33.4 | 35.3 |
| 1970 | 78.8 | 23.5 | 15.4 | 36.4 | 3.5 | 54.4 | 84.2 | 62.1 | 33.6 | 36.1 |
| 1971 | 79.0 | 24.4 | 15.9 | 35.6 | 3.0 | 55.3 | 84.6 | 62.7 | 33.4 | 37.7 |
| 1972 | 82.8 | 25.9 | 16.9 | 36.7 | 3.3 | 57.2 | 87.1 | 64.5 | 34.4 | 39.4 |
| 1973 | 81.7 | 24.7 | 16.3 | 36.5 | 4.2 | 64.7 | 97.5 | 73.0 | 41.3 | 45.2 |
| 1974 | 78.7 | 23.8 | 15.7 | 36.1 | 3.1 | 76.0 | 102.0 | 88.0 | 57.0 | 58.0 |
| 1975 | 79.8 | 26.3 | 17.6 | 32.6 | 3.3 | 103.0 | 118.0 | 102.0 | 92.0 | 88.0 |
| 1976 | 71.0 | 23.9 | 16.0 | 28.3 | 2.9 | 134.0 | 150.0 | 130.0 | 124.0 | 123.0 |

Source: American Gas Association, Gas Facts

Table 4.4

Sales of Natural Gas in Montana[1]
by Gas Utilities (MMCF)
(Continued on next page)

| Year | Montana Power Company | | | | | | Montana-Dakota Utilities | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential and Commercial | Industrial | Other | Total | % of Total Sales | Sales to Canada | Residential and Commercial | Industrial | Other | Total | % of Total Sales |
| 1950 | 8,648 | 8,942 | 705 | 18,295 | 56 | 0 | 4,228 | 240 | 469 | 4,937 | 15 |
| 1951 | 8,848 | 13,055 | 720 | 22,623 | 61 | 0 | 5,514 | 1,180 | 499 | 7,193 | 19 |
| 1952 | NA | NA | NA | NA | NA | NA | 7,340 | 1,845 | 468 | 9,653 | NA |
| 1953 | 8,848 | 13,700 | 719 | 23,267 | 63 | 0 | 7,223 | 1,863 | 480 | 9,566 | 26 |
| 1954 | 9,406 | 12,323 | 746 | 22,475 | 61 | 0 | 7,912 | 1,649 | 495 | 10,056 | 27 |
| 1955 | 12,204 | 15,621 | 826 | 28,651 | 65 | 0 | 7,594 | 1,996 | 533 | 10,123 | 23 |
| 1956 | 12,076 | 15,720 | 788 | 28,584 | 65 | 0 | 7,708 | 2,212 | 509 | 10,429 | 24 |
| 1957 | 13,661 | 15,677 | 834 | 30,172 | 66 | 0 | 7,797 | 2,056 | 492 | 10,345 | 23 |
| 1958 | 13,445 | 15,334 | 836 | 29,615 | 64 | 0 | 7,429 | 3,233 | 551 | 11,213 | 24 |
| 1959 | 15,576 | 12,802 | 1,025 | 29,403 | 62 | 0 | 8,678 | 2,934 | 507 | 12,119 | 25 |
| 1960 | 15,604 | 15,641 | 1,150 | 32,395 | 64 | 0 | 8,516 | 3,148 | 342 | 12,006 | 24 |
| 1961 | 15,567 | 16,824 | 1,165 | 33,556 | 64 | 0 | 8,689 | 3,606 | 177 | 12,472 | 24 |
| 1962 | 16,233 | 18,265 | 1,211 | 35,709 | 66 | 0 | 9,148 | 3,051 | 103 | 12,302 | 23 |
| 1963 | 15,901 | 19,831 | 1,265 | 36,997 | 66 | 0 | 8,826 | 3,862 | 79 | 12,767 | 23 |
| 1964 | 18,031 | 21,131 | 1,396 | 40,558 | 66 | 0 | 9,620 | 4,687 | 55 | 14,362 | 23 |
| 1965 | 19,255 | 22,382 | 1,452 | 43,089 | 65 | 0 | 10,955 | 4,430 | 61 | 15,446 | 23 |
| 1966 | 18,954 | 23,256 | 1,456 | 43,666 | 67 | 90 | 10,414 | 4,256 | 55 | 14,725 | 22 |
| 1967 | 19,255 | 20,977 | 1,528 | 41,760 | 66 | 106 | 10,584 | 3,813 | 67 | 14,464 | 23 |
| 1968 | 20,327 | 21,871 | 1,645 | 43,843 | 66 | 104 | 10,847 | 4,523 | 65 | 15,435 | 23 |
| 1969 | 21,177 | 25,758 | 1,669 | 48,604 | 66 | 112 | 11,534 | 6,277 | 55 | 17,866 | 24 |
| 1970 | 21,897 | 27,709 | 1,591 | 51,197 | 65 | 109 | 11,499 | 8,582 | 102 | 20,183 | 26 |
| 1971 | 22,060 | 26,339 | 1,637 | 50,036 | 65 | 113 | 11,612 | 8,317 | 139 | 20,068 | 26 |
| 1972 | 23,142 | 27,525 | 1,682 | 52,349 | 65 | 126 | 12,352 | 8,218 | 600 | 21,170 | 26 |
| 1973 | 22,896 | 26,791 | 1,686 | 51,373 | 64 | 88 | 11,525 | 8,685 | 1,415 | 21,623 | 27 |
| 1974 | 21,831 | 26,492 | 1,589 | 49,912 | 65 | 31 | 11,230 | 8,455 | 588 | 20,273 | 26 |
| 1975 | 23,942 | 24,484 | 1,717 | 50,143 | 64 | 66 | 12,785 | 7,244 | 586 | 20,615 | 26 |
| 1976 | 21,666 | 21,043 | 1,593 | 44,302 | 63 | 38 | 12,208 | 6,782 | 318 | 19,308 | 27 |

Table 4.4 (Continued)

| Year | Great Falls Gas Company | | | | | Other Utilities | | Total Sales | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential and Commercial | Industrial | Other | Total | % of Total Sales | Total for all Sectors | % of Total Sales | Residential and Commercial | Industrial | Other | Total |
| 1950 | 2,509 | 208 | 53 | 2,770 | 9 | 6,481 | 20 | 21,866 | 9,390 | 1,227 | 32,483 |
| 1951 | 2,697 | 311 | 191 | 3,199 | 9 | 4,055 | 11 | 21,114 | 14,546 | 1,410 | 37,070 |
| 1952 | 2,566 | 228 | 333 | 3,127 | NA | 852 | NA | NA | NA | NA | NA |
| 1953 | 2,478 | 238 | 350 | 3,066 | 8 | 814 | 2 | 19,363 | 15,801 | 1,549 | 36,713 |
| 1954 | 2,795 | 255 | 400 | 3,450 | 9 | 892 | 2 | 21,005 | 14,227 | 1,641 | 36,873 |
| 1955 | 3,284 | 243 | 434 | 3,961 | 9 | 1,049 | 2 | 24,131 | 17,860 | 1,793 | 43,784 |
| 1956 | 3,361 | 204 | 396 | 3,961 | 9 | 1,019 | 2 | 24,164 | 18,136 | 1,693 | 44,090 |
| 1957 | 3,510 | 258 | 451 | 4,219 | 9 | 955 | 2 | 25,923 | 17,991 | 1,777 | 45,691 |
| 1958 | 3,365 | 268 | 475 | 4,108 | 9 | 1,067 | 2 | 25,306 | 18,835 | 1,862 | 46,003 |
| 1959 | 4,048 | 388 | 566 | 5,002 | 10 | 1,175 | 2 | 29,477 | 16,124 | 2,098 | 47,699 |
| 1960 | 3,928 | 512 | 516 | 4,956 | 10 | 1,152 | 2 | 29,200 | 19,301 | 2,008 | 50,509 |
| 1961 | 4,067 | 380 | 606 | 5,053 | 10 | 1,045 | 2 | 29,368 | 20,810 | 1,948 | 52,126 |
| 1962 | 4,092 | 371 | 752 | 5,215 | 10 | 1,078 | 2 | 30,551 | 21,687 | 2,066 | 54,304 |
| 1963 | 4,030 | 396 | 793 | 5,219 | 9 | 945 | 2 | 29,702 | 24,089 | 2,137 | 55,928 |
| 1964 | 4,446 | 480 | 847 | 5,773 | 9 | 1,018 | 2 | 33,115 | 26,298 | 2,298 | 61,711 |
| 1965 | 4,767 | 499 | 868 | 6,134 | 9 | 1,160 | 2 | 36,137 | 27,311 | 2,381 | 65,829 |
| 1966 | 4,593 | 490 | 846 | 5,929 | 9 | 1,125 | 2 | 35,086 | 28,002 | 2,357 | 65,445 |
| 1967 | 4,505 | 397 | 856 | 5,758 | 9 | 1,160 | 2 | 35,504 | 25,187 | 2,451 | 63,142 |
| 1968 | 4,504 | 424 | 852 | 5,780 | 9 | 1,074 | 2 | 36,752 | 26,818 | 2,562 | 66,132 |
| 1969 | 5,042 | 412 | 891 | 6,345 | 9 | 1,118 | 1 | 38,871 | 32,447 | 2,615 | 73,933 |
| 1970 | 4,926 | 378 | 902 | 6,206 | 8 | 1,010 | 1 | 39,332 | 36,669 | 2,595 | 78,596 |
| 1971 | 4,901 | 367 | 895 | 6,163 | 8 | 1,048 | 1 | 39,621 | 35,023 | 2,671 | 77,315 |
| 1972 | 5,185 | 353 | 884 | 6,422 | 8 | 1,105 | 1 | 41,784 | 36,096 | 3,166 | 81,046 |
| 1973 | 4,729 | 414 | 864 | 6,007 | 8 | 982 | 1 | 40,132 | 35,890 | 3,965 | 79,987 |
| 1974 | 4,504 | 412 | 807 | 5,723 | 7 | 936 | 1 | 38,501 | 35,359 | 2,984 | 76,844 |
| 1975 | 5,145 | 354 | 845 | 6,344 | 8 | 1,000 | 1 | 42,872 | 32,082 | 3,148 | 78,102 |
| 1976 | 4,875 | 237 | 892 | 6,004 | 9 | 762 | 1 | 39,511 | 28,062 | 2,803 | 70,376 |

[1] Excludes all sales for resale. See appendix for additional notes.
Source: Annual Reports by Gas Utilities to the Montana Public Service Commission.

Table 4.5

Average Annual Natural Gas Prices
in Montana (cents/MCF)

| Year | Wellhead | Retail | Delivered | Residential | Commercial | Industrial |
|---|---|---|---|---|---|---|
| 1950 | 5.3 | 28.7 | 30.1 | 47.3 | 32.8 | 14.2 |
| 1951 | 5.5 | 31.3 | 32.0 | 51.0 | 35.1 | 16.0 |
| 1952 | 6.1 | 31.8 | 32.4 | 50.7 | 35.2 | 19.2 |
| 1953 | 5.9 | 32.9 | 33.7 | 53.1 | 36.8 | 19.4 |
| 1954 | 6.8 | 37.5 | 38.8 | 58.9 | 41.5 | 20.1 |
| 1955 | 6.7 | 36.7 | 38.0 | 58.3 | 41.1 | 20.2 |
| 1956 | 6.8 | 36.8 | 38.2 | 58.5 | 41.2 | 20.6 |
| 1957 | 7.2 | 36.9 | 38.0 | 58.3 | 41.3 | 20.8 |
| 1958 | 6.8 | 38.4 | 40.1 | 64.7 | 44.3 | 21.8 |
| 1959 | 7.5 | 41.6 | 45.6 | 64.7 | 45.7 | 26.7 |
| 1960 | 7.1 | 41.6 | 45.4 | 66.0 | 46.4 | 27.4 |
| 1961 | 7.4 | 40.3 | 43.8 | 65.5 | 45.9 | 25.7 |
| 1962 | 7.4 | 41.9 | 46.4 | 75.2 | 50.6 | 25.1 |
| 1963 | 7.5 | 41.3 | 46.2 | 74.6 | 50.7 | 26.8 |
| 1964 | 7.8 | 45.7 | 49.5 | 76.3 | 53.3 | 30.3 |
| 1965 | 8.2 | 46.8 | 50.6 | 78.1 | 54.1 | 31.1 |
| 1966 | 8.3 | 45.8 | 49.5 | 77.9 | 54.3 | 30.4 |
| 1967 | 8.4 | 49.9 | 54.6 | 79.6 | 57.1 | 34.1 |
| 1968 | 9.1 | 50.9 | 55.4 | 82.2 | 60.3 | 32.6 |
| 1969 | 10.2 | 52.2 | 56.2 | 88.2 | 64.3 | 33.8 |
| 1970 | 10.3 | 52.9 | 57.2 | 90.7 | 65.9 | 33.9 |
| 1971 | 12.1 | 56.3 | 60.3 | 93.4 | 68.5 | 35.7 |
| 1972 | 12.3 | 58.7 | 63.0 | 96.5 | 69.1 | 38.1 |
| 1973 | 23.6 | 66.1 | 69,8 | 108.6 | 80.4 | 42.5 |
| 1974 | 25.2 | 75.8 | 80.4 | 111.9 | 92.6 | 58.0 |
| 1975 | 43.3 | 104.6 | 108.9 | 129.6 | 110.1 | 94.9 |
| 1976 | 44.5 | NA | NA | 136.4 | 118.7 | 99.7 |

Source: United States Department of Energy. Energy Information Administration

Table 4.6

Natural Gas Production and Consumption
in Montana (million cubic feet)

| Year | Gross Withdrawal | Marketed Production | Consumption | Total Gas Delivered | Residential | Commercial | Industrial | Electric Utilities | Other |
|---|---|---|---|---|---|---|---|---|---|
| 1950 | 40975 | 38972 | 38333 | 35002 | 12596 | 7536 | 13979 | 892 | NA |
| 1951 | 36897 | 36225 | 37276 | 35598 | 12287 | 7379 | 15047 | 884 | NA |
| 1952 | 29140 | 28557 | 41545 | 38476 | 12263 | 7794 | 17422 | 998 | NA |
| 1953 | 28245 | 27736 | 40953 | 37368 | 12029 | 7544 | 16559 | 1237 | NA |
| 1954 | 30532 | 30087 | 41002 | 37101 | 13314 | 8277 | 14909 | 601 | NA |
| 1955 | 28841 | 28100 | 47861 | 43631 | 15335 | 9427 | 18240 | 630 | NA |
| 1956 | 26852 | 25706 | 48305 | 43651 | 15235 | 9314 | 18226 | 876 | NA |
| 1957 | 30830 | 28481 | 54868 | 48224 | 16725 | 10116 | 18429 | 2954 | NA |
| 1958 | 30830 | 27836 | 54725 | 46659 | 14970 | 9546 | 18960 | 3183 | NA |
| 1959 | 32819 | 30575 | 51898 | 45877 | 17310 | 11124 | 16438 | 1005 | NA |
| 1960 | 37792 | 33235 | 54271 | 48543 | 16825 | 11820 | 19558 | 339 | NA |
| 1961 | 36798 | 33716 | 57465 | 50985 | 17086 | 12140 | 21404 | 354 | NA |
| 1962 | 32621 | 29791 | 62952 | 54785 | 17078 | 12302 | 21713 | 3692 | NA |
| 1963 | 31228 | 29862 | 66969 | 57740 | 17274 | 12569 | 24613 | 3285 | NA |
| 1964 | 26653 | 25050 | 67282 | 60706 | 18792 | 13059 | 26419 | 2437 | NA |
| 1965 | 29800 | 28105 | 70895 | 64320 | 19908 | 14110 | 28310 | 1992 | NA |
| 1966 | 36048 | 30685 | 73829 | 66306 | 19690 | 14068 | 29571 | 2977 | NA |
| 1967 | 31610 | 25866 | 65782 | 58358 | 19756 | 13090 | 22584 | 502 | 2426 |
| 1968 | 32229 | 19313 | 63642 | 57148 | 19711 | 11529 | 23155 | 631 | 2122 |
| 1969 | 68064 | 41229 | 78988 | 71493 | 21463 | 14239 | 31917 | 1520 | 2354 |
| 1970 | 48302 | 42705 | 90823 | 81992 | 24794 | 15520 | 36105 | 2529 | 3044 |
| 1971 | 38136 | 32720 | 89021 | 81363 | 25379 | 15734 | 36800 | 1075 | 2375 |
| 1972 | 38137 | 33474 | 85161 | 77348 | 23787 | 16521 | 33192 | 1218 | 2630 |
| 1973 | 60931 | 56175 | 91148 | 84286 | 24923 | 16786 | 37898 | 2322 | 2357 |
| 1974 | 59524 | 54873 | 80766 | 74505 | 21590 | 14353 | 35202 | 1111 | 2249 |
| 1975 | 44547 | 40734 | 80351 | 75441 | 24097 | 16233 | 31631 | 1059 | 2421 |
| 1976 | 45097 | 42563 | 78094 | 73114 | 23525 | 15490 | 31049 | 709 | 2341 |

Source: United States Department of Energy, Energy Information Administration

Table 4.7

Capacity and Production of Natural Gas
Processing Plants in Montana

| Year | Number of Plants | Input (MMCF/day) | | Average Production for 12 months (gallons/day) | | | | | | | Journal Issue |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gas Capacity | Gas Through put | Propane | Normal Butane | LP-gas mix | raw NGL mix | Debutanized Natural Gasoline | Other | Total Products | |
| 1961 | 2 | 66.2 | 32.0 | 8,000 | 8,600 | - | 39,400 | - | - | 56,000 | 4/30/62 |
| 1962 | 2 | 65.8 | 27.4 | 9,400 | 8,000 | - | 37,000 | - | - | 54,400 | 3/25/63 |
| 1963 | 2 | 65.8 | 21.9 | 6,100 | 6,400 | - | 32,200 | - | - | 44,700 | 3/16/64 |
| 1964 | 2 | 55.8 | 23.3 | 6,800 | 7,600 | - | 38,700 | - | - | 53,100 | 3/29/65 |
| 1965 | 2 | 55.8 | 24.3 | 3,700 | 8,900 | - | 38,400 | - | - | 51,000 | 5/02/66 |
| 1966 | 5 | 66.8 | 32.9 | 30,800 | 9,200 | 6,000 | 77,240 | - | - | 123,240 | 3/20/67 |
| 1967 | 5 | 360.9 | 272.9 | 23,325 | 9,000 | 25,370 | 47,155 | - | - | 104,850 | 3/25/68 |
| 1968 | 5 | 107.8 | 82.5 | 32,500 | 9,000 | 15,000 | 54,900 | - | - | 111,400 | 4/07/69 |
| 1969 | 4 | 68.8 | 57.0 | 37,500 | 9,000 | 15,000 | 75,000 | - | - | 136,500 | 7/13/70 |
| 1970 | 7 | 75.8 | 42.7 | 40,800 | 11,000 | - | 60,500 | 35,680 | - | 147,980 | 7/12/71 |
| 1971 | 6 | 73.3 | 40.3 | 33,550 | 9,400 | 6,000 | 59,400 | 9,590 | - | 117,940 | 7/10/72 |
| 1972 | 4 | 44.3 | 29.6 | 24,900 | 9,400 | - | 43,500 | 9,500 | - | 87,390 | 7/09/73 |
| 1973 | 4 | 44.3 | 21.3 | 28,727 | 6,026 | 17,000 | 13,576 | - | - | 65,329 | 7/08/74 |
| 1974 | 4 | 45.3 | 20.6 | 30,786 | 8,260 | - | 9,000 | 10,466 | 17,000 | 75,512 | 7/14/75 |
| 1975 | 4 | 44.3 | 26.1 | 31,200 | 9,100 | - | 9,000 | 8,350 | 16,000 | 73,650 | 7/05/76 |
| 1976 | 8 | 56.3 | 28.5 | 30,300 | 9,600 | 24,000 | 16,000 | 22,600 | - | 102,500 | 7/11/77 |

Source: Oil and Gas Journal, Annual Gas Processing Survey

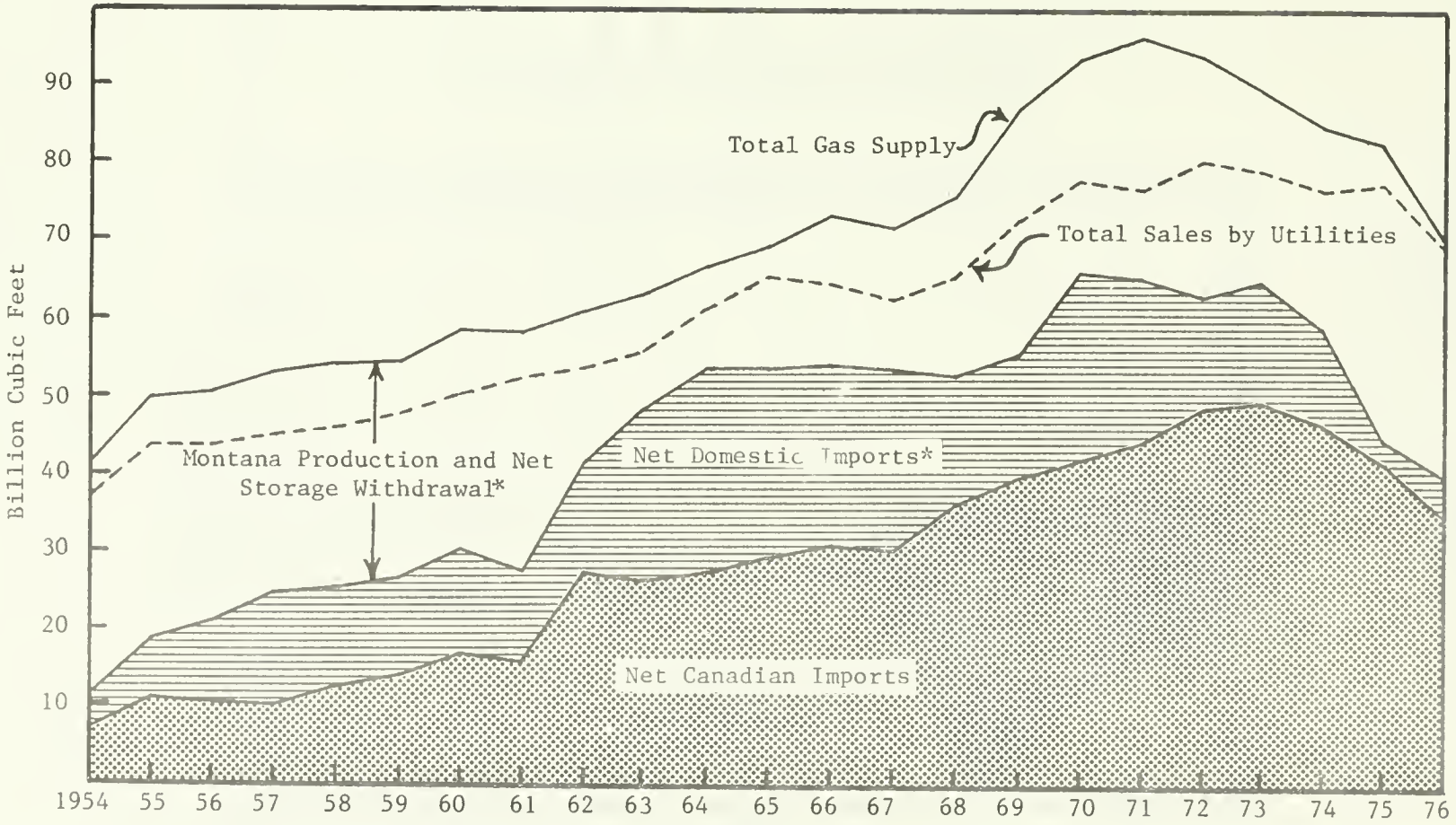
Table 4.8

Montana Imports and Exports of Natural Gas
(million cubic feet)

| Year | Total Imports [1,2] | Total Exports [1,3] | Net Imports (Exports) | Net Import (Export) of Natural Gas by Source | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Montana-Dakota Utilities[1] | | | MPC[2] | Northern Natural |
| | | | | N. Dakota | S. Dakota | Wyoming | Canada | Exports[3] |
| 1950 | 2,791 | 6,688 | (3,897) | (2,974) | (3,094) | 2,171 | 0 | |
| 1951 | 11,788 | 7,817 | 3,971 | (3,338) | (4,014) | 11,323 | 0 | |
| 1952 | 20,385 | 6,972 | 13,413 | (3,140) | (3,500) | 12,293 | 7,760 | |
| 1953 | 23,189 | 8,164 | 15,025 | (3,213) | (4,570) | 13,633 | 9,175 | |
| 1954 | 21,361 | 10,065 | 11,296 | (3,947) | (5,813) | 14,246 | 6,810 | |
| 1955 | 30,297 | 11,651 | 18,646 | (4,546) | (6,671) | 19,042 | 10,821 | |
| 1956 | 33,071 | 11,884 | 21,187 | 1,223 | (8,014) | 17,661 | 10,317 | |
| 1957 | 36,040 | 11,461 | 24,579 | 1,581 | (7,560) | 20,296 | 10,262 | |
| 1958 | 36,569 | 10,926 | 25,643 | 1,387 | (6,739) | 18,412 | 12,583 | |
| 1959 | 40,813 | 13,792 | 27,021 | 531 | (8,586) | 20,990 | 14,086 | |
| 1960 | 44,362 | 13,630 | 30,732 | 1,750 | (8,691) | 21,043 | 16,630 | |
| 1961 | 42,032 | 14,001 | 28,031 | 715 | (8,869) | 20,586 | 15,599 | |
| 1962 | 54,660 | 12,658 | 42,002 | 3,969 | (8,815) | 19,255 | 27,593 | |
| 1963 | 59,021 | 9,827 | 49,194 | 10,563 | (8,515) | 20,318 | 26,828 | |
| 1964 | 64,542 | 10,512 | 54,030 | 10,603 | (9,295) | 25,359 | 27,364 | |
| 1965 | 64,512 | 10,294 | 54,218 | 8,206 | (8,417) | 25,124 | 29,305 | |
| 1966 | 66,811 | 12,073 | 54,738 | 7,593 | (9,268) | 25,402 | 31,011 | |
| 1967 | 65,927 | 11,602 | 54,325 | 7,262 | (9,352) | 25,752 | 30,663 | |
| 1968 | 65,787 | 12,281 | 53,506 | 6,493 | (9,424) | 20,137 | 36,300 | |
| 1969 | 72,778 | 16,461 | 56,317 | 4,558 | (9,505) | 21,464 | 39,800 | |
| 1970 | 88,501 | 21,241 | 67,260 | 3,448 | (9,323) | 30,535 | 42,600 | |
| 1971 | 84,997 | 18,851 | 66.146 | 1,310 | (10,218) | 30,454 | 44,600 | |
| 1972 | 85,335 | 24,136 | 61,199 | (283) | (12,193) | 27,615 | 48,600 | 2,540 |
| 1973 | 83,979 | 46,630 | 37,349 | (1,340) | (12,448) | 29,583 | 50,000 | 28,446 |
| 1974 | 84,901 | 44,980 | 39,921 | (6,457) | (11,923) | 30,946 | 47,152 | 19,797 |
| 1975 | 69,109 | 39,131 | 29,978 | (7,481) | (12,613) | 23,419 | 42,197 | 15,544 |
| 1976 | 56,950 | 32,900 | 24.050 | (7,191) | (11,015) | 23,419 | 35,588 | 14,649 |

1 Source: Montana-Dakota Utilities  2 Source: U.S. Department of Energy, Energy Information Administration
3 Source: Montana Department of Natural Resources, Oil and Gas Conservation Division

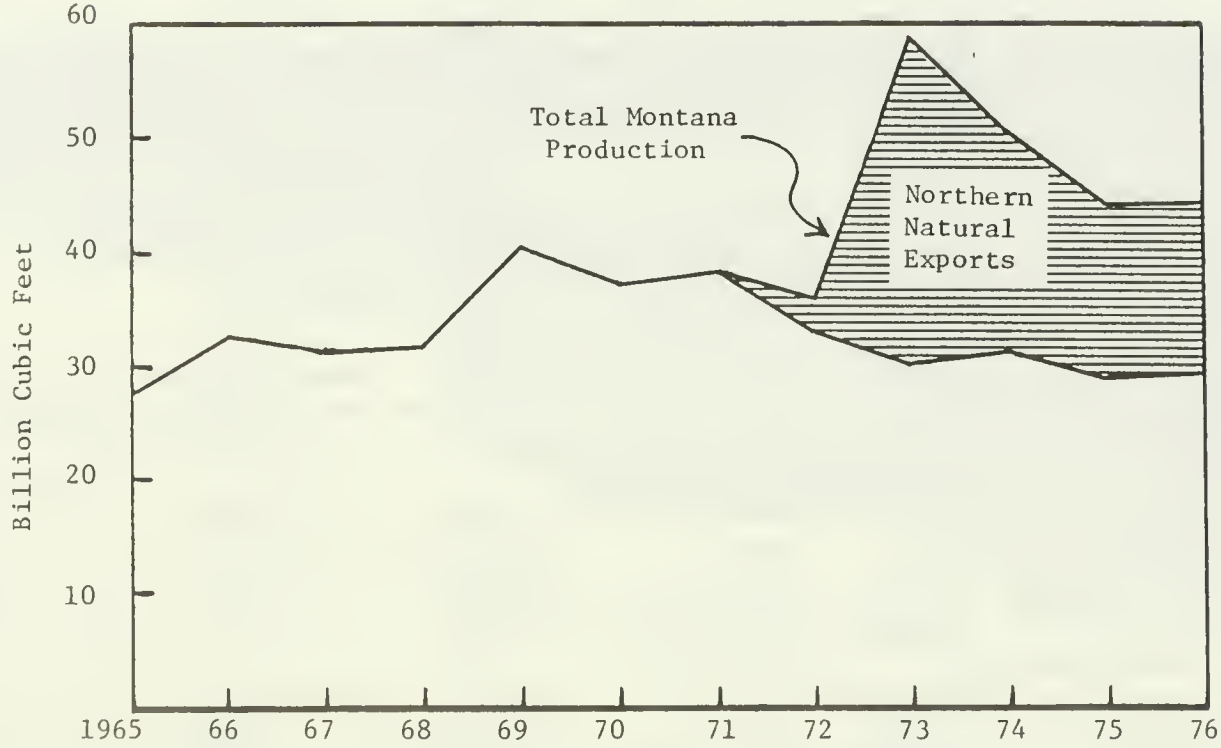
Figure 4.3




Supply of Natural Gas in Montana, by Source Region, 1954-1976

* excludes exports by Northern Natural Gas Co. from Tiger Ridge area.

Figure 4.4




Montana Natural Gas Production and Exports
by Northern Natural Gas Co., 1965-1976

Table 4.9

Consumption of Natural Gas by
Mining and Manufacturing in Montana in 1976
(million cubic feet)

| SIC code | | 1976 consumption | | |
|---|---|---|---|---|
| | | Firm | Interruptible | Total |
| 10-14 | Mining | -- | 628 | 628 |
| 20 | Food and Kindred Products | | 2,560 | 2,560 |
| 24 | Lumber and Wood Products | | 915 | 915 |
| 26 | Paper and Allied Products | | 3,936 | 3,936 |
| 28 | Chemicals and Allied | | 687 | 687 |
| 29 | Petroleum and Coal Products | | 4,387 | 4,387 |
| 32 | Stone, Clay, Glass, and Concrete Products | | 3,316 | 3,316 |
| 333-339 | Primary Non-ferrous Metals | | 10,146 | 10,146 |
| 37 | Transportation Equipment | | 309 | 309 |
| | Not classified/unreported | 2,236 | | 2,236 |
| Total Consumption | | 2,236 | 26,884 | 29,120 |

Source: Gas Requirements Agency, University of Denver Research Institute

V

# CRUDE PETROLEUM AND PETROLEUM PRODUCTS

## HIGHLIGHTS

- Montana's year-end crude oil proved reserves was estimated at 152,670,000 barrels in 1976--down 7 percent from the previous year.

- Crude oil production was down slightly in 1976, but the average wellhead price reached over $8.40 for the first time on record in Montana.

- The state's crude oil refined in 1976 totaled 50,322,000 barrels--an increase of 4.5 percent from 1975.

- Gasoline production in Montana amounted to 16,281,000 barrels in 1976 which is an increase of 5 percent from a year earlier.

- Gasoline sales totaled 11,722,000 barrels in 1976--up 7 percent from 1975.

- The top three crude oil refineries in Montana remained Continental Oil Company in Billings, Exxon Corporation in Billings, and Farmer's Union Oil Company in Laurel.

Table 5.1

Crude Oil Proved Reserves in the United States and Montana
1950-1976 (thousand barrels)

| Year | Year-End Proved Reserves | |
|---|---|---|
| | United States | Montana |
| 1950 | 25,268,398 | 111,272 |
| 1951 | 27,468,031 | 108,418 |
| 1952 | 27,960,554 | 156,181 |
| 1953 | 28,944,828 | 208,985 |
| 1954 | 29,560,746 | 272,394 |
| 1955 | 30,012,170 | 298,948 |
| 1956 | 30,434,649 | 331,414 |
| 1957 | 30,300,405 | 319,991 |
| 1958 | 30,535,917 | 337,799 |
| 1959 | 31,719,347 | 309,268 |
| 1960 | 31,613,211 | 266,687 |
| 1961 | 31,758,505 | 250,909 |
| 1962 | 31,389,223 | 248,860 |
| 1963 | 30,969,990 | 271,253 |
| 1964 | 30,990,510 | 251,620 |
| 1965 | 31,352,391 | 274,145 |
| 1966 | 31,452,127 | 281,608 |
| 1967 | 31,376,670 | 307,972 |
| 1968 | 30,707,117 | 345,117 |
| 1969 | 29,631,862 | 275,765 |
| 1970 | 39,001,335 | 241,529 |
| 1971 | 38,062,957 | 228,185 |
| 1972 | 36,339,408 | 241,248 |
| 1973 | 35,299,839 | 219,343 |
| 1974 | 34,249,956 | 207,389 |
| 1975 | 32,682,127 | 163,968 |
| 1976 | 30,942,166 | 152,670 |

Source: American Petroleum Institute

Table 5.2

Estimate of Montana Crude Oil
Proved Reserves, by Region, January 1, 1977

| Region | Proved Reserves (million barrels) | Percent of Total |
|---|---|---|
| Northeastern Montana | 40.8 | 18 |
| Southeastern Montana | 105.2 | 45 |
| Central Montana | 33.1 | 14 |
| South Central Montana | 9.8 | 4 |
| Northern Montana | 43.6 | 19 |
| State Total | 232.5 | 100 |

Source: Montana Department of Natural Resources and Conservation, Oil and Gas Conservation Division, Annual Review for 1976, Volume 20.

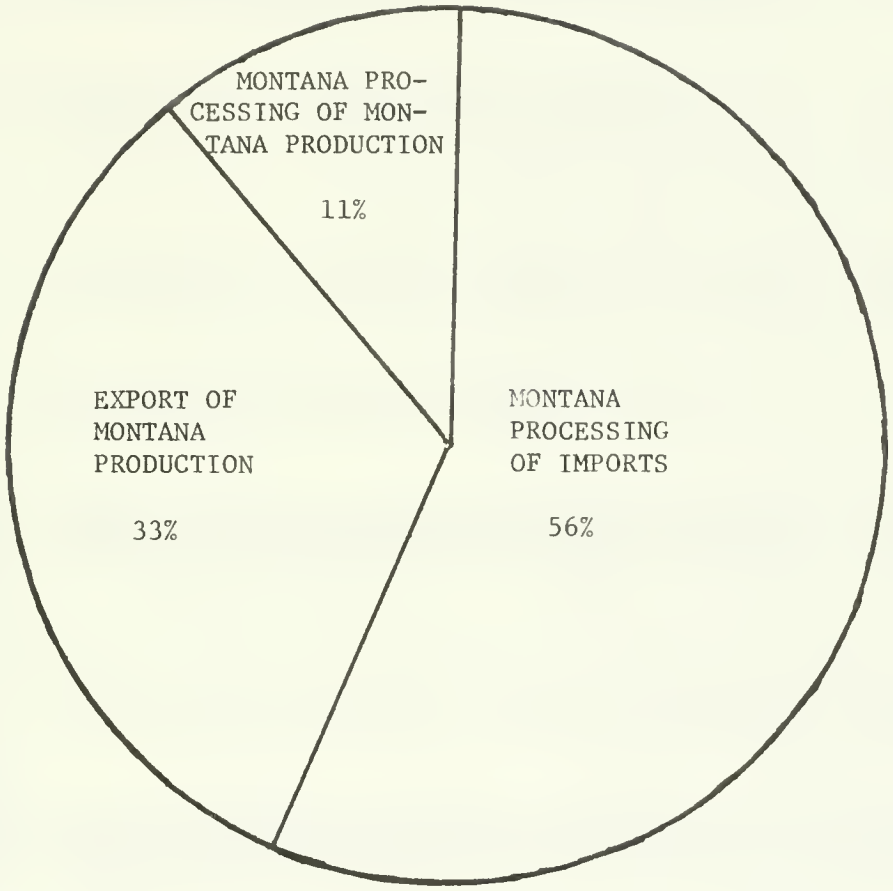
Table 5.3

Crude Oil Production (1000 barrels) and
Average Wellhead Prices (Dollars per barrel)
in Montana

| Year | Production[1] of Crude Oil | Wellhead[2] Price | Production[3] of Crude Oil | Wellhead[3] Price |
|---|---|---|---|---|
| 1950 | 8109 | 2.52 | 7841 | 2.47 |
| 1951 | 8958 | 2.47 | 8814 | 2.35 |
| 1952 | 9606 | 2.25 | 9527 | 2.26 |
| 1953 | 11920 | 2.18 | 11793 | 2.23 |
| 1954 | 14195 | 2.20 | 14023 | 2.22 |
| 1955 | 15654 | 2.26 | 16548 | 2.18 |
| 1956 | 21760 | 2.58 | 21262 | 2.47 |
| 1957 | 27122 | 2.70 | 26658 | 2.43 |
| 1958 | 27957 | 2.65 | 27816 | 2.62 |
| 1959 | 29857 | 2.56 | 29985 | 2.50 |
| 1960 | 30240 | 2.41 | 29937 | 2.45 |
| 1961 | 30906 | 2.42 | 30499 | 2.42 |
| 1962 | 31648 | 2.42 | 31270 | 2.44 |
| 1963 | 30870 | 2.44 | 30364 | 2.44 |
| 1964 | 30647 | 2.43 | 30241 | 2.45 |
| 1965 | 32778 | 2.43 | 32089 | 2.44 |
| 1966 | 35380 | 2.44 | 34734 | 2.45 |
| 1967 | 34959 | 2.50 | 34316 | 2.50 |
| 1968 | 48460 | 2.57 | 47152 | 2.56 |
| 1969 | 43954 | 2.69 | 44446 | 2.76 |
| 1970 | 37879 | 2.78 | 38058 | 2.83 |
| 1971 | 34599 | 3.01 | 34625 | 3.05 |
| 1972 | 33904 | 3.07 | 34572 | 2.99 |
| 1973 | 34620 | 3.33 | 34584 | 3.85 |
| 1974 | 34554 | 6.65 | 34629 | 6.82 |
| 1975 | 32844 | 7.83 | 32815 | 7.83 |
| 1976 | 32814 | 8.42 | 32057 | 8.49 |

[1] Source: Montana Oil and Gas Conservation Division
[2] Source: U. S. Bureau of Mines
[3] Source: Montana Department of Revenue

Figure 5.1




Supply of Crude Oil in Montana in 1976

Table 5.4

Crude Oil Refined in Montana Refineries
By Source of Crude (1000 barrels)

| | Continental Oil (Billings) | | | | Exxon (Billings)[1/] | | | | Farmers Union (Laurel) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Montana | Wyoming | Canada | Total | Montana | Wyoming | Canada | Total | Montana | Wyoming | Canada | Total |
| 1953 | 337 | 2753 | | 3089 | 1067 | 6277 | | 7344 | 949 | 3083 | | 4032 |
| 1954 | 623 | 2277 | | 2909*/ | 1641 | 5355 | | 6995 | 1618 | 3234 | | 4853 |
| 1955 | 1268 | 2077 | | 3358*/ | 1778 | 5225 | | 7004 | 1446 | 3908 | | 5354 |
| 1956 | 560 | 2671 | | 3231 | 1352 | 7095 | | 8447 | 1916 | 3936 | | 5852 |
| 1957 | 681 | 2795 | | 3475 | 1777 | 6602 | | 8378 | 1830 | 4249 | | 6078 |
| 1958 | 807 | 2313 | | 3120 | 2316 | 4445 | | 6792 | 1395 | 3113 | | 4509 |
| 1959 | 971 | 2793 | | 3765 | 4414 | 6760 | | 11173 | 1215 | 5589 | | 6804 |
| 1960 | 728 | 3422 | | 4151 | 3634 | 6175 | | 9808 | 2008 | 4786 | | 6794 |
| 1961 | 729 | 3955 | | 4685 | 3583 | 5991 | | 9574 | 1859 | 4092 | | 5951 |
| 1962 | 1954 | 3434 | 185 | 5573 | 2519 | 9496 | 12 | 12028 | 2754 | 3740 | | 6495 |
| 1963 | 2418 | 2241 | 1046 | 5705 | 2200 | 8739 | 495 | 11435 | 2974 | 3425 | | 6699 |
| 1964 | 3732 | 1548 | 3692 | 8973 | 2275 | 9530 | 288 | 12093 | 2723 | 4603 | | 7326 |
| 1965 | 2697 | 3068 | 4593 | 10359 | 2293 | 9659 | 37 | 11989 | 2635 | 3665 | | 6300 |
| 1966 | 1773 | 4148 | 4674 | 10595 | 2318 | 9557 | 0 | 11875 | 2079 | 4415 | | 6494 |
| 1967 | 1813 | 3936 | 5052 | 10802 | 2073 | 11851 | 0 | 13924 | 1833 | 5606 | | 7439 |
| 1968 | 1714 | 1995r | 10125r | 13834 | 1451 | 12387 | 222 | 14060 | 1264 | 6533 | | 7797 |
| 1969 | 1637 | 3443r | 8482r | 13562 | 1240 | 11964 | 360 | 13564 | 1539 | 6723 | | 8261 |
| 1970 | 1351 | 3345r | 9123r | 13820 | 1090 | 11062 | 2381 | 14532 | 1355 | 4935 | 2404 | 8695 |
| 1971 | 1170 | 3592r | 10070r | 14833 | 1046 | 10997 | 2564 | 14607 | 1526 | 5143 | 3369 | 10038 |
| 1972 | 1119 | 3796r | 12240r | 17154 | 849 | 10821 | 3706 | 15376 | 1703 | 4625 | 4229 | 10556 |
| 1973 | 1046 | 3272r | 12170r | 16488 | 1089 | 10011 | 5568 | 16668 | 1672 | 4952 | 5299 | 11922 |
| 1974 | 1340 | 4299r | 11113r | 16752 | 744 | 8753 | 4870 | 14367 | 1599 | 3897 | 5697 | 11192 |
| 1975 | 1703 | 5478r | 9291r | 16472 | 879 | 8615 | 5606 | 15100 | 1466 | 5373 | 4339 | 11178 |
| 1976 | 1846 | 4495 | 11125 | 17466 | 1005 | 7719 | 5818 | 14542 | 1200 | 6097 | 5354 | 12651 |

1/ Formerly Humble Oil (1960-1972) and Carter Oil (1953-1959).
*/ Includes 9,000 barrels from South Dakota in 1954 and 13,000 barrels from South Dakota in 1955.
r Revised by the Montana Energy Advisory Council

(continued)

Table 5.4 (Continued)

| Year | Big West Oil (Kevin) | | | Phillips (Great Falls) | | | Tesoro (Wolf Point)[2/] | | | Westco (Cut Bank)[3/] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Montana | Canada | Total | Montana | Canada | Total | Montana | Canada | Total | Montana | Canada | Total |
| 1953 | 686 | | 686 | 857 | | 857 | | | | 1305 | | 1305 |
| 1954 | 652 | | 652 | 839 | | 839 | | | | 1252 | | 1252 |
| 1955 | 705 | | 705 | 874 | | 874 | | | | 1279 | | 1279 |
| 1956 | 729 | | 729 | 997 | 7 | 1004 | 86 | | 86 | 1257 | 47 | 1304 |
| 1957 | 742 | | 742 | 831 | 16 | 847 | 98 | | 98 | 1258 | 54 | 1312 |
| 1958 | 751 | | 751 | 995 | | 995 | 45 | | 45 | 1203 | 12 | 1215 |
| 1959 | 805 | | 805 | 1226 | | 1226 | 55 | | 55 | 1175 | 4 | 1180 |
| 1960 | 775 | | 775 | 1298 | | 1298 | 17 | | 17 | 1142 | 21 | 1162 |
| 1961 | 831 | | 831 | 1318 | | 1318 | 0 | | 0 | 1099 | 14 | 1114 |
| 1962 | 852 | 3 | 855 | 1436 | | 1436 | 0 | | 0 | 1050 | 41 | 1091 |
| 1963 | 916 | | 916 | 1616 | | 1616 | 0 | | 0 | 1130 | 11 | 1141 |
| 1964 | 920 | | 920 | 1491 | | 1491 | 78 | | 78 | 880 | 21 | 901 |
| 1965 | 1034 | | 1034 | 1500 | | 1500 | 508 | | 508 | 1134 | 24 | 1158 |
| 1966 | 765 | | 765 | 1619 | | 1619 | 681 | | 681 | 1159 | 9 | 1169 |
| 1967 | 967 | | 967 | 1770 | | 1770 | 747 | | 747 | 1191 | | 1191 |
| 1968 | 1290 | | 1290 | 1690 | | 1690 | 820 | | 820 | 1258 | | 1258 |
| 1969 | 1101 | | 1101 | 1609 | | 1609 | 861 | | 861 | 1274 | | 1274 |
| 1970 | 1207 | | 1207 | 1691 | | 1691 | 806 | | 806 | 1388 | | 1388 |
| 1971 | 1136 | | 1136 | 1955 | | 1955 | 843 | | 843 | 1371 | | 1371 |
| 1972 | 523r | 705r | 1228r | 2120 | | 2120 | 765 | | 765 | 954r | 276r | 1230r |
| 1973 | 675r | 784r | 1469 | 2220 | | 2220 | 668 | | 668 | 1057r | 464r | 1513r |
| 1974 | 519r | 940r | 1459 | 2056 | 81 | 2136 | 590 | 23 | 613 | 1142r | 392r | 1534r |
| 1975 | 398r | 820r | 1218r | 1724 | 433 | 2158 | 687 | 4 | 690 | 1145r | 166r | 1311r |
| 1976 | 565 | 658 | 1223 | 1557 | 539 | 2076 | 959 | | 959 | 1406 | | 1406 |

2/ Formerly Texstar Petroleum (1959-1964) and the Texas-Calgary Co. (1956-1958).
3/ Formerly Union Oil Company (1953-1970).
r Revised by the Montana Energy Office (formerly the Montana Energy Advisory Council)

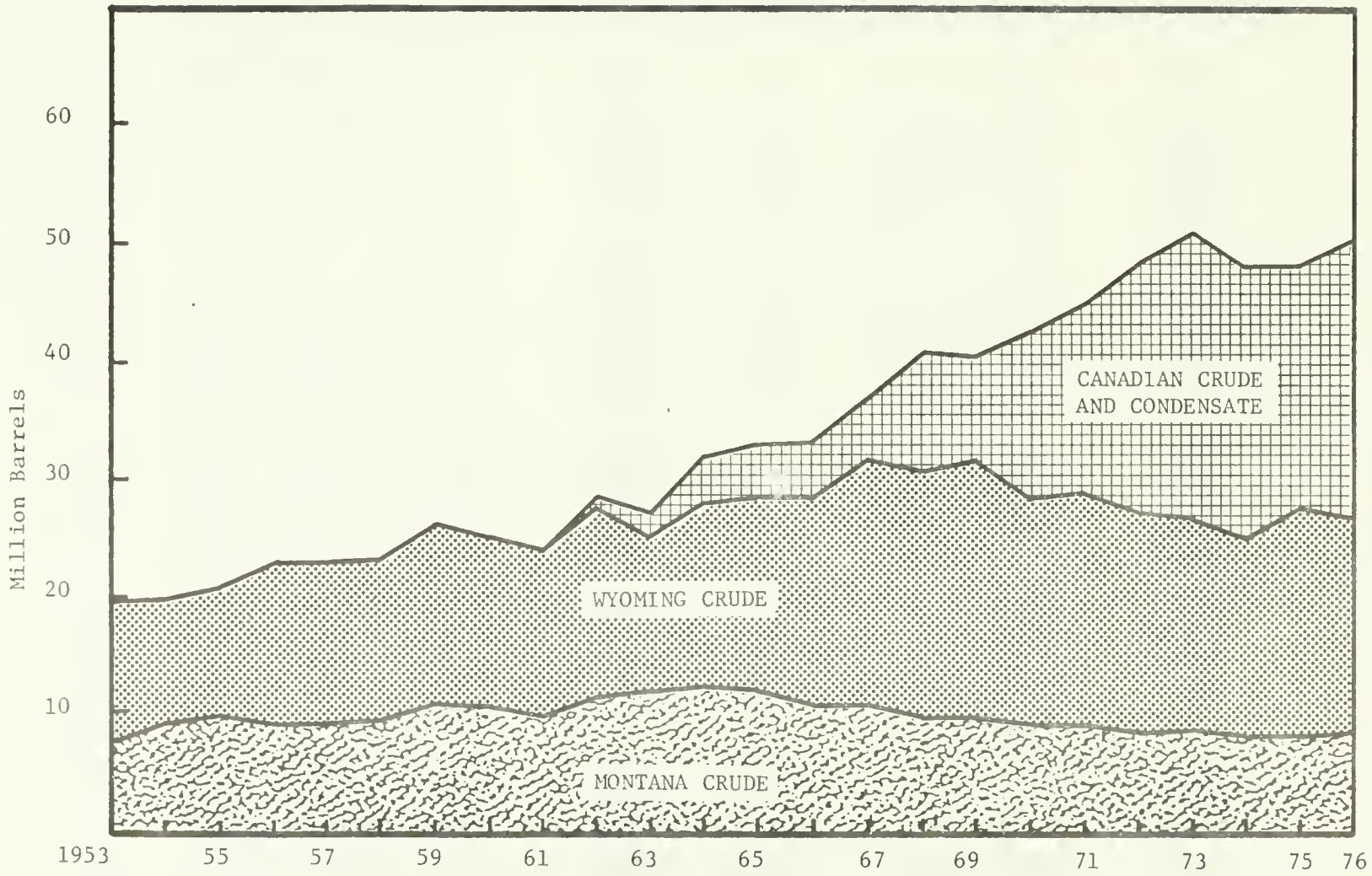
(continued)

Table 5.4 (Continued)

| Year | Diamond Asphalt (Chinook) | | | Jet Fuel Refinery (Mosby) | | | Other Refineries[4/] | |
|---|---|---|---|---|---|---|---|---|
| | Montana | Canada | Total | Montana | Wyoming | Total | Montana | Total |
| 1953 | 0 | | 0 | 26 | | 26 | 2272 | 2272 |
| 1954 | 74 | | 74 | 175 | | 175 | 2161 | 2161 |
| 1955 | 241 | | 241 | 127 | | 127 | 2139 | 2139 |
| 1956 | 215 | 33 | 249 | 113 | 18 | 131 | 1828 | 1828 |
| 1957 | 195 | 10 | 205 | 138 | 20 | 158 | 1673 | 1685*/ |
| 1958 | 202 | | 202 | 121 | 5 | 127 | 1299 | 1299 |
| 1959 | 277 | | 277 | 179 | | 179 | 595 | 595 |
| 1960 | 218 | | 218 | 116 | | 116 | 595 | 595 |
| 1961 | 236 | 19 | 255 | 110 | | 110 | 31 | 31 |
| 1962 | 186 | 22 | 207 | 51 | 37 | 92**/ | 373 | 373 |
| 1963 | 148 | | 148 | 326 | 40 | 366 | 70 | 70 |
| 1964 | 95 | | 95 | 57 | | 57 | 41 | 41 |
| 1965 | 111 | | 111 | 58 | | 58 | | |
| 1966 | 165 | | 165 | 66 | | 66 | | |
| 1967 | 173 | | 173 | 65 | | 65 | | |
| 1968 | 173 | | 173 | 30 | | 30 | | |
| 1969 | 174 | | 174 | 30 | | 30 | | |
| 1970 | 158 | | 158 | 34 | | 34 | | |
| 1971 | 190 | | 190 | 25 | | 25 | | |
| 1972 | 144 | | 144 | 19 | | 19 | | |
| 1973 | 3 | | 3 | 7 | | 7 | | |
| 1974 | 0 | | 0 | 0 | | 0 | | |
| 1975 | 0 | | 0 | 0 | | 0 | | |
| 1976 | 0 | | 0 | 0 | | 0 | | |

*/ Includes 12,000 barrels to Unity Petroleum Company from Canada in 1957.
**/ Includes 4,000 barrels from Canada in 1962.
4/ Includes Modern Oil Company (1953-1954), Texaco Incorporated (1953-1960), Unity Petroleum Company (1957-1958), PetroFuels Company (1961-1964), and North Star Refinery (1964).

Figure 5.2




Petroleum Refined in Montana, By source of Crude
(In Million Barrels)

Table 5.5

Total Crude Oil Refined in Montana by Source
(1000 Barrels)

| Year | Montana | Percent of Total | Wyoming | Percent of Total | Canada | Percent of Total | Total |
|---|---|---|---|---|---|---|---|
| 1953 | 7497 | 38.3 | 12112 | 61.7 | 0 | 0.0 | 19609 |
| 1954 | 9034 | 45.4 | 10865 | 54.5 | 0 | 0.0 | 19909*/ |
| 1955 | 9858 | 46.8 | 11210 | 53.1 | 0 | 0.0 | 21081*/ |
| 1956 | 9053 | 39.6 | 13720 | 60.0 | 88 | 0.4 | 22861 |
| 1957 | 9222 | 40.1 | 13665 | 59.5 | 92 | 0.4 | 22979 |
| 1958 | 9165 | 39.4 | 14089 | 60.5 | 12 | 0.1 | 23265 |
| 1959 | 10913 | 41.9 | 15141 | 58.1 | 4 | 0.0 | 26059 |
| 1960 | 10531 | 42.3 | 14383 | 57.7 | 21 | 0.1 | 24935 |
| 1961 | 9797 | 41.0 | 14038 | 58.8 | 33 | 0.1 | 23869 |
| 1962 | 11175 | 39.7 | 16708 | 59.4 | 266 | 0.9 | 28149 |
| 1963 | 11798 | 42.0 | 14745 | 52.5 | 1553 | 5.5 | 28097 |
| 1964 | 12292 | 38.4 | 15714 | 49.1 | 4002 | 12.5 | 32007 |
| 1965 | 11971 | 36.2 | 16416 | 49.7 | 4654 | 14.1 | 33041 |
| 1966 | 10626 | 31.8 | 18120 | 54.2 | 4684 | 14.0 | 33429 |
| 1967 | 10632 | 28.7 | 21393 | 57.7 | 5052 | 13.6 | 37078 |
| 1968 | 9690 | 23.7 | 20915r | 51.0 | 10347r | 25.2 | 40951 |
| 1969 | 9465 | 23.4 | 22130r | 54.7 | 8843r | 21.9 | 40438 |
| 1970 | 9080 | 21.5 | 19342r | 45.7 | 13908r | 32.8 | 42330 |
| 1971 | 9262 | 20.6 | 19732r | 43.8 | 16003r | 35.6 | 44997 |
| 1972 | 8194r | 16.9 | 19241r | 39.6 | 21156r | 43.5 | 48591r |
| 1973 | 8437r | 16.9 | 18235r | 35.8 | 24295r | 47.7 | 50967r |
| 1974 | 7989r | 16.6 | 16949r | 35.3 | 23115r | 48.1 | 48053 |
| 1975 | 8002r | 16.6 | 19465r | 40.4 | 20690r | 43.0 | 48157r |
| 1976 | 8517 | 16.9 | 18311 | 36.4 | 23494 | 46.7 | 50322 |

*/ Includes 9,000 barrels from South Dakota in 1954 and 13,000 barrels from South Dakota in 1955.

r Revised by the Montana Energy Advisory Council

Source: Montana Oil and Gas Conservation Division

Table 5.6

Consumption of Motor Fuels in Montana
(1000 barrels)

| Year | Total Use of Motor Fuel | Highway Use of Motor Fuel | | | Nonhighway Use of Motor Fuel | Losses due to evaporation, handling, etc. |
|---|---|---|---|---|---|---|
| | | Total | Gasoline | Diesel and LPG | | |
| 1950 | 5,553 | 4,208 | 4,027 | 181 | 1,262 | 83 |
| 1951 | 5,764 | 4,641 | 4,410 | 231 | 1,038 | 85 |
| 1952 | 6,239 | 4,777 | 4,482 | 295 | 1,370 | 92 |
| 1953 | 6,464 | 5,460 | 5,123 | 337 | 911 | 93 |
| 1954 | 6,772 | 5,275 | 4,870 | 405 | 1,401 | 96 |
| 1955 | 6,989 | 5,459 | 5,047 | 412 | 1,436 | 94 |
| 1956 | 7,364 | 5,990 | 5,569 | 421 | 1,271 | 103 |
| 1957 | 7,400 | 5,777 | 5,302 | 475 | 1,554 | 69 |
| 1958 | 7,479 | 6,216 | 5,703 | 513 | 1,193 | 70 |
| 1959 | 7,928 | 6,321 | 5,694 | 627 | 1,535 | 72 |
| 1960 | 8,161 | 6,420 | 5,772 | 648 | 1,666 | 75 |
| 1961 | 8,674 | 6,470 | 5,726 | 744 | 2,124 | 80 |
| 1962 | 8,320 | 7,247 | 6,525 | 722 | 986 | 87 |
| 1963 | 8,376 | 7,169 | 6,373 | 796 | 1,118 | 89 |
| 1964 | 8,446 | 7,344 | 6,504 | 840 | 1,016 | 86 |
| 1965 | 8,866 | 7,609 | 6,683 | 926 | 1,164 | 93 |
| 1966 | 9,153 | 8,093 | 7,063 | 1,030 | 970 | 90 |
| 1967 | 9,260 | 8,116 | 7,148 | 968 | 1,049 | 95 |
| 1968 | 9,806 | 8,743 | 7,654 | 1,089 | 967 | 96 |
| 1969 | 10,114 | 9,353 | 8,166 | 1,187 | 664 | 97 |
| 1970 | 10,826 | 9,781 | 8,397 | 1,384 | 944 | 101 |
| 1971 | 11,216 | 10,321 | 8,862 | 1,459 | 794 | 101 |
| 1972 | 12,147 | 11,039 | 9,393 | 1,646 | 1,004 | 104 |
| 1973 | 13,091 | 12,124 | 10,292 | 1,832 | 856 | 111 |
| 1974 | 12,411 | 11,547 | 9,810 | 1,737 | 758 | 106 |
| 1975 | 12,556 | 11,372 | 9,641 | 1,731 | 1,077 | 107 |

Source: U.S. Department of Transportation, Hiway Statistics

Table 5.7

Production and Consumption
of Gasoline in Montana
(1000 barrels)

| Year | Gasoline Manufactured [1] | Gasoline Imported [1] | Gasoline Exported [1] | Gasoline Sold [1] | Production of Gasoline [2] | Consumption of Gasoline [2] |
|---|---|---|---|---|---|---|
| 1950 | 6,981 | 513 | 2,057 | 5,438 | 6,756 | 5,389 |
| 1951 | 7,899 | 570 | 2,930 | 5,540 | 7,732 | 5,533 |
| 1952 | 8,235 | 611 | 2,902 | 5,944 | 8,158 | 5,944 |
| 1953 | 8,742 | 592 | 3,206 | 6,127 | 8,926 | 6,127 |
| 1954 | 8,452 | 632 | 2,716 | 6,369 | 8,637 | 6,367 |
| 1955 | 8,991 | 547 | 2,974 | 6,592 | 8,967 | 6,580 |
| 1956 | 10,106 | 534 | 3,711 | 6,929 | 9,621 | 6,929 |
| 1957 | 10,604 | 561 | 4,264 | 6,906 | 9,856 | 6,906 |
| 1958 | 11,438 | 548 | 5,081 | 6,966 | 9,518 | 6,966 |
| 1959 | 12,590 | 491 | 5,781 | 7,301 | 10,452 | 7,302 |
| 1960 | 12,129 | 475 | 5,090 | 7,513 | 10,539 | 7,513 |
| 1961 | 11,284 | 337 | 3,789 | 7,831 | 10,328 | 7,930 |
| 1962 | 12,596 | 406 | 4,294 | 8,707 | 11,943 | 8,753 |
| 1963 | 12,320 | 450 | 4,028 | 8,741 | 12,733 | 8,848 |
| 1964 | 12,591 | 289 | 4,214 | 8,666 | 15,304 | 8,631 |
| 1965 | 13,751 | 282 | 4,731 | 9,303 | 15,603 | 9,349 |
| 1966 | 13,910 | 185 | 4,952 | 9,143 | 17,014 | 9,350 |
| 1967 | 14,565 | 326 | 5,115 | 9,776 | 18,757 | 9,458 |
| 1968 | 14,320 | 223 | 5,183 | 9,360 | 21,210 | 9,560 |
| 1969 | 14,629 | 275 | 5,104 | 9,800 | 21,397 | 9,664 |
| 1970 | 13,007 | 194 | 3,952 | 9,249 | 22,233 | 10,125 |
| 1971 | 13,613 | 214 | 4,090 | 9,737 | 23,922 | 10,598 |
| 1972 | 14,390 | 219 | 4,251 | 10,358 | 27,053 | 10,899 |
| 1973 | 15,191 | 634 | 4,792 | 11,033 | 27,313 | 11,305 |
| 1974 | 14,923 | 229 | 4,495 | 10,657 | 27,133 | 10,667 |
| 1975 | 15,498 | 176 | 4,759 | 10,914 | NA | NA |
| 1976 | 16,281 | 212 | 4,771 | 11,722 | NA | NA |

[1] Source: Montana Department of Revenue, Motor Fuel Tax Division
[2] Source: United States Department of Energy

Table 5.8

Sales of Petroleum Products in Montana
(1000 barrels)

| Year | Distillate Fuel Oil | Residual Fuel Oil | Kerosene | LPG |
|---|---|---|---|---|
| 1950 | 2,478 | 4,222 | 231 | 211 |
| 1951 | 2,851 | 4,958 | 267 | 275 |
| 1952 | 3,063 | 4,220 | 277 | 324 |
| 1953 | 3,553 | 3,276 | 252 | 402 |
| 1954 | 3,755 | 1,751 | 261 | 537 |
| 1955 | 3,980 | 1,692 | 215 | 537 |
| 1956 | 4,219 | 1,646 | 213 | 610 |
| 1957 | 4,209 | 1,554 | 201 | 661 |
| 1958 | 3,642 | 1,643 | 303 | 296 |
| 1959 | 4,474 | 2,006 | 544 | 811 |
| 1960 | 4,713 | 2,022 | 476 | 737 |
| 1961 | 4,589 | 2,533 | 359 | 856 |
| 1962 | 5,522 | 3,049 | 265 | 819 |
| 1963 | 5,400 | 2,836 | 348 | 765 |
| 1964 | 5,684 | 2,356 | 651 | 931 |
| 1965 | 5,041 | 1,195 | 248 | 926 |
| 1966 | 5,802 | 1,371 | 117 | 1,165 |
| 1967 | 3,459 | 1,189 | 860 | 1,585 |
| 1968 | 4,119 | 1,495 | 816 | 1,685 |
| 1969 | 4,669 | 1,524 | 656 | 1,690 |
| 1970 | 4,823 | 1,249 | 376 | 1,327 |
| 1971 | 5,101 | 1,236 | 362 | 1,403 |
| 1972 | 6,121 | 1,485 | 383 | 1,704 |
| 1973 | 6,924 | 1,705 | 405 | 1,502 |
| 1974 | 7,646 | 2,290 | 174 | 1,465 |
| 1975 | 7,459 | 2,186 | 126 | 1,370 |
| 1976 | 8,383 | 2,549 | 80 | 1,420 |

Source: United States Department of Energy, Energy Information Administration

Table 5.9

Sales of Residual Fuel Oil
in Montana by Sector
(1000 barrels)

| Year | Heating | Industrial | Electric Utility | Oil Company | Military | Railroads | Other | Total |
|---|---|---|---|---|---|---|---|---|
| 1960 | 354 | 439 | 2 | 817 | 70 | 299 | 41 | 2,022 |
| 1961 | 465 | 649 | 0 | 756 | 151 | 455 | 57 | 2,533 |
| 1962 | 1,011 | 568 | 0 | 931 | 86 | 385 | 68 | 3,049 |
| 1963 | 879 | 652 | 3 | 807 | 11 | 396 | 88 | 2,836 |
| 1964 | 503 | 664 | 53 | 712 | 9 | 299 | 116 | 2,356 |
| 1965 | 504 | 65 | 0 | 257 | 0 | 313 | 56 | 1,195 |
| 1966 | 482 | 56 | 45 | 342 | 118 | 263 | 65 | 1,371 |
| 1967 | 419 | 48 | 6 | 296 | 102 | 228 | 90 | 1,189 |
| 1968 | 419 | 102 | 23 | 681 | 56 | 185 | 29 | 1,495 |
| 1969 | 226 | 232 | 105 | 683 | 54 | 179 | 45 | 1,524 |
| 1970 | 183 | 109 | 9 | 792 | 45 | 74 | 37 | 1,249 |
| 1971 | 177 | 225 | 0 | 732 | 45 | 40 | 17 | 1,236 |
| 1972 | 209 | 227 | 16 | 967 | 32 | 32 | 2 | 1,485 |
| 1973 | 208 | 243 | 71 | 1,112 | 16 | 28 | 27 | 1,705 |
| 1974 | 376 | 465 | 3 | 1,307 | 80 | 44 | 15 | 2,290 |
| 1975 | 429 | 543 | 0 | 1,022 | 127 | 38 | 27 | 2,186 |
| 1976 | 858 | 562 | 0 | 962 | 147 | 0 | 20 | 2,549 |

Source: United States Department of Energy

Table 5.10

Sales of Distillate Fuel Oil
in Montana by Sector
(1000 barrels)

| Year | Heating | Industrial | Electric Utility | Oil Company | Military | Railroads | Other | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Diesel | Total | |
| 1960 | 902 | 141 | 0 | 7 | 57 | 2,241 | 1,312 | 1,365 | 4,713 |
| 1961 | 1,132 | 125 | 0 | 9 | 29 | 1,880 | 1,288 | 1,414 | 4,589 |
| 1962 | 1,324 | 220 | 0 | 12 | 26 | 1,720 | 1,946 | 2,220 | 5,522 |
| 1963 | 1,307 | 213 | 0 | 47 | 41 | 1,701 | 1,868 | 2,088 | 5,400 |
| 1964 | 1,080 | 361 | 0 | 39 | 38 | 1,833 | 2,050 | 2,330 | 5,684 |
| 1965 | 1,096 | 210 | 0 | 15 | 17 | 1,632 | 2,026 | 2,067 | 5,041 |
| 1966 | 1,092 | 257 | 0 | 22 | 0 | 1,464 | 2,662 | 2,967 | 5,802 |
| 1967 | 829 | 99 | 0 | 2 | 11 | 1,362 | NA | 1,156 | 3,459 |
| 1968 | 1,045 | 114 | 0 | 10 | 16 | 1,270 | 1,423 | 1,664 | 4,119 |
| 1969 | 1,197 | 148 | 14 | 60 | 20 | 1,469 | 1,537 | 1,761 | 4,669 |
| 1970 | 1,011 | 144 | 0 | 14 | 26 | 1,623 | 1,808 | 2,005 | 4,823 |
| 1971 | 1,095 | 136 | 0 | 18 | 22 | 1,674 | 2,026 | 2,156 | 5,101 |
| 1972 | 1,219 | 774 | 9 | 40 | 43 | 1,808 | 1,988 | 2,228 | 6,121 |
| 1973 | 1,337 | 890 | 159 | 31 | 29 | 1,918 | NA | 2,560 | 6,924 |
| 1974 | 1,346 | 1,090 | 49 | 35 | 28 | 2,302 | 2,430 | 2,796 | 7,646 |
| 1975 | 1,425 | 1,236 | 59 | 38 | 35 | 1,999 | 2,305 | 2,667 | 7,459 |
| 1976 | 1,789 | 1,156 | 117 | 41 | 12 | 1,955 | 2,876 | 3,313 | 8,383 |

Source: United States Department of Energy, Energy Information Administration

Table 5.11

Sales of LPG
in Montana by Sector
(1000 barrels)

| Year | Residential and Commercial | Internal Combustion Engine Use | Industrial Usage | Other Usage | TOTAL Usage |
|---|---|---|---|---|---|
| 1960 | 596 | 125 | 16 | 0 | 737 |
| 1961 | 724 | 118 | 11 | 3 | 856 |
| 1962 | 659 | 132 | 27 | 1 | 819 |
| 1963 | 587 | 126 | 51 | 1 | 765 |
| 1964 | 771 | 102 | 58 | 0 | 931 |
| 1965 | 748 | 46 | 132 | 0 | 926 |
| 1966 | 891 | 65 | 209 | 0 | 1,165 |
| 1967 | 1,170 | 162 | 253 | 0 | 1,585 |
| 1968 | 1,257 | 188 | 240 | 0 | 1,685 |
| 1969 | 1,261 | 199 | 229 | 1 | 1,690 |
| 1970 | 1,044 | 99 | 179 | 5 | 1,327 |
| 1971 | 1,065 | 132 | 202 | 4 | 1,403 |
| 1972 | 1,287 | 199 | 211 | 7 | 1,704 |
| 1973 | 1,136 | 169 | 191 | 5 | 1,502 |
| 1974 | 1,207 | 139 | 119 | 0 | 1,465 |
| 1975 | 1,145 | 123 | 101 | 0 | 1,370 |
| 1976 | 1,168 | 114 | 138 | 0 | 1,420 |

Source: United States Department of Energy, Energy Information Admin.

Table 5.12

Distribution of Montana Crude Oil Exports
by State of Destination
(thousand barrels)

| Destination | 1973 | 1974 | 1975 | 1976 |
|---|---|---|---|---|
| Pennsylvania | 346 | 360 | 769 | 368 |
| Illinois | 3,096 | 2,608 | 2,236 | 7,713 |
| Indiana | 13,720 | 14,435 | 10,907 | 7,422 |
| Kansas | 1,638 | 1,065 | 1,020 | 935 |
| Minnesota, Wisconsin | 1,199 | 1,617 | 2,026 | 2,029 |
| Missouri, Nebraska | 0 | 80 | 654 | 1,268 |
| North Dakota | 1,065 | 1,374 | 1,304 | 1,285 |
| Ohio | 80 | 115 | 59 | 225 |
| Oklahoma | 0 | 50 | 0 | 0 |
| Colorado | 793 | 573 | 256 | 83 |
| Wyoming | 654 | 361 | 498 | 26 |
| Utah | 0 | 0 | 784 | 0 |
| Other States | 0 | 0 | 0 | 1 |
| Total | 22,591 | 22,638 | 20,513 | 21,355 |

Source: United States Department of Energy, Energy Information Administration, "Crude Petroleum, Petroleum Products and Natural Gas Liquids. Fiscal Summary,"

# VI

# URANIUM

Table 6.1

Estimated Uranium Ore Reserves
by States, January 1, 1975

| State | Tons of Ore (Millions) | Grade of Ore (% $U_3O_8$) | Tons of $U_3O_8$ |
|---|---|---|---|
| New Mexico | 74.8 | 0.22 | 168,000 |
| Wyoming | 62.2 | 0.16 | 102,000 |
| Colorado | 2.9 | 0.28 | 8,000 |
| Utah | 2.8 | 0.21 | 6,000 |
| Others: | | | |
| Arizona<br>North Dakota<br>South Dakota<br>Texas<br>Washington<br>Oregon<br>Montana<br>California<br>Alaska | 24.9 | 0.12 | 31,000 |
| Total | 167.6 | 0.99 | 315,000 |

Source: United States Energy Research and Development Administration, press release, "ERDA Estimates United States Uranium Reserves," March 21, 1975.

Table 6.2

Existing Uranium Leases on State Land in Montana as of November 1, 1977

| COUNTY | ACRES | COMPANY |
|---|---|---|
| BEAVERHEAD | 7107 | Lucky Mc Uranium Corp. |
| | 440 | E. O. Larson |
| BLAINE | 840 | Pioneer Nuclear, Inc., etal |
| CARTER | 1920 | Montana Nuclear Corp. |
| | 1252 | Exxon Corp. |
| | 6728 | Kerr McGee Corp. |
| | 640 | Frontier Res., Inc. |
| | 800 | Mobile Oil Corp. |
| | 1600 | Felmont Oil Corp. |
| | 960 | Homestake Mining Co. |
| CHOUTEAU | 120 | Wyoming Mineral Corp. |
| FALLON | 480 | Felmont Oil Corp. |
| GALLATIN | 2080 | Lucky Mc Uranium Corp. |
| HILL | 1880 | Pioneer Nuclear, Inc., etal. |
| JEFFERSON | 7126 | Lucky Mc Uranium |
| JUDITH BASIN | 400 | Continental Oil Co. |
| LEWIS & CLARK | 1120 | St. Joe American Corp. |
| McCONE | 640 | Wyoming Mineral Corp. |
| MEAGHER | 2560 | Lucky Mc Uranium |
| STILLWATER | 9120 | Sabine Production Co. |
| SWEETWATER | 320 | Sabine Production Co. |
| TOTAL | 48,133 | |

Source: Montana Department of State Lands

Table 6.3

Active Uranium Prospecting Permits
in Montana, as of June 1, 1977

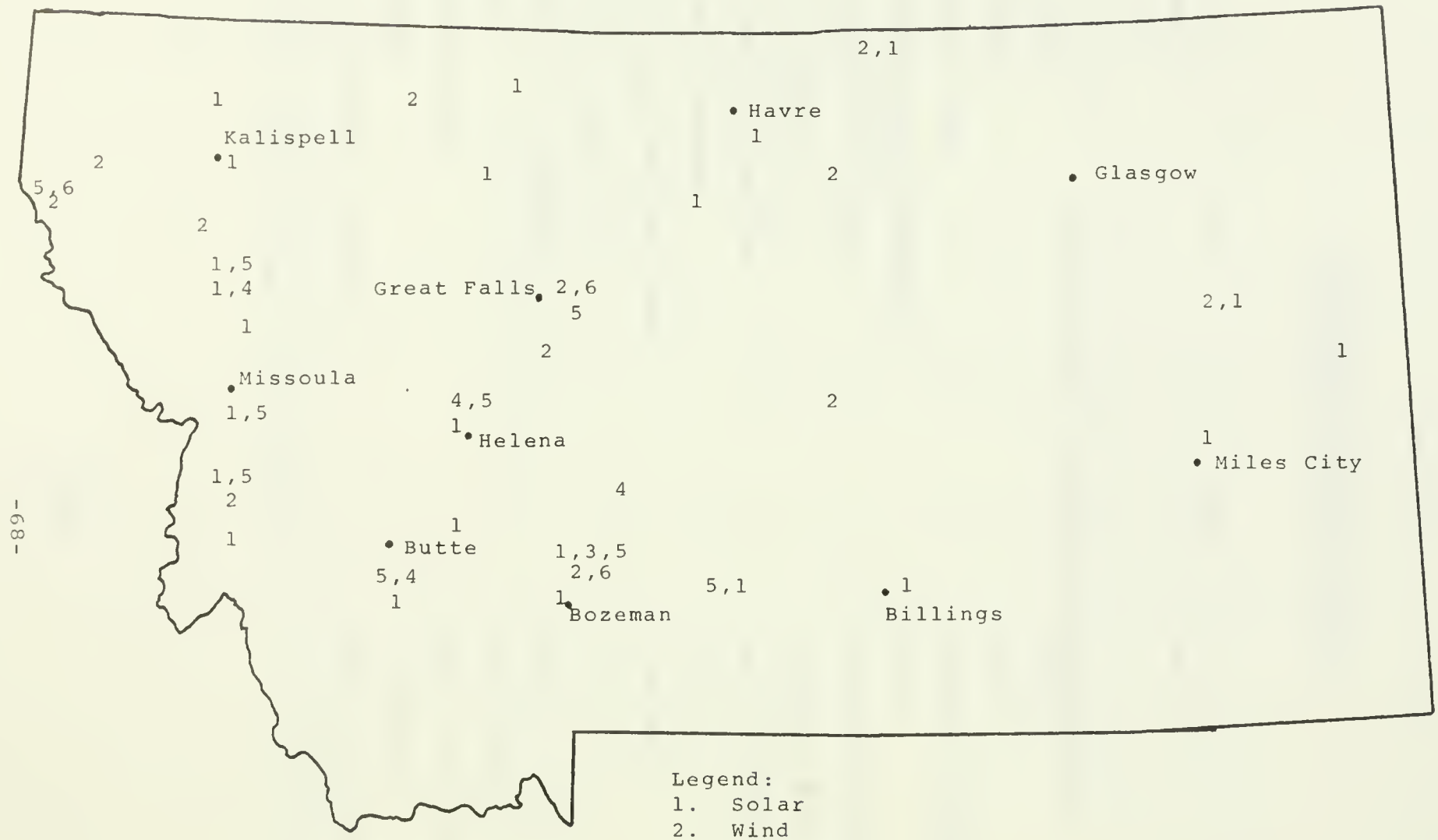
| Permittee | County |
|---|---|
| Anschutz | Carbon |
| Bur West | Carbon |
| Bureau of Mines | Missoula and Ravalli |
| Cominco American Incorporated | Carbon |
| Continental Oil Company | Jefferson and Mineral |
| Exxon Company, U.S.A. | Broadwater, Carbon, and Carter |
| Felmont Oil Corporation | Carter and Fallon |
| Frontier Resources | Carter |
| Gulf Mineral Resources Company | Musselshell |
| Kerr-McGee Corporation | Carter |
| Mobil Oil Corporation | Carter |
| NRG | Powder River |
| Pioneer Nuclear | Carter and Madison |
| Sabine | Stillwater |
| Wyoming Mineral Corporation | Fergus, Judith Basin, and McCane |

Source: Montana Department of State Lands.

# VII

# RENEWABLE ENERGY PROJECTS

LOCATION OF SENATE BILL 86 PROJECTS FUNDED IN 1976 & 1977



## SOLAR PROJECTS FUNDED BY SENATE BILL 86 in 1976

| PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT AMOUNT |
|---|---|---|
| 1. Solar Demonstrations | Jim Anderson<br>Jocko Hollow Alternative<br>Energy Effort<br>Arlee, MT | $20,000.00 |
| 2. Solar School | Belgrade Public Schools<br>Ralph V. Kroon, Superintendent<br>School District #44<br>Belgrade, MT | 10,750.00 |
| 3. New Western Energy Show | AERO (Kye Cochran)<br>435 Stapleton Building<br>Billings, MT | 24,480.00 |
| 4. Solar Home | James W. Coons<br>208 North 29th, Suite 212<br>Billings, MT | 11,000.00 |
| 5. Solar/Wood Heat | Charles W. Fowlkes<br>5 Faculty Court<br>Bozeman, MT | 10,000.00 |
| 6. Solar Monitoring | Charles W. Fowlkes<br>5 Faculty Court<br>Bozeman, MT | 29,790.00 |
| 7. Solar Heating | David Leavengood<br>Bridge Canyon, R.R. 2<br>Bozeman, MT | 10,500.00 |
| 8. Solar Heating of Domestic Water | Kenneth Nordtvedt, Jr.<br>Physics Department<br>Montana State University<br>Bozeman, MT | 4,000.00 |
| 9. Solar Home | Charles L. Herndon, P.E.<br>Montana College of Mineral Science and Technology<br>Butte, MT | 15,000.00 |
| 10. Solar Home | Mike Stoltz<br>109 5th Highland Park<br>Glendive, MT | 8,805.00 |
| 11. Solar Heat | L. Clark MacDonald<br>Bootlegger Trail<br>Great Falls, MT | 8,743.70 |

| PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT AMOUNT |
|---|---|---|
| 12. Solar Home | James E. Taylor<br>2715 Airport Way<br>Helena, MT | $12,750.00 |
| 13. Solar Home | Sherman S. Cook, Jr.<br>Lincoln, MT | 10,500.00 |
| 14. Residential Solar Air System | Dist. 11 Human Resources Council<br>207 East Main<br>Missoula, MT | 26,875.00 |
| 15. Solar Home | John R. Means<br>Route 5, Pattee Canyon<br>Missoula, MT | 4,000.00 |
| 16. Solar Home | Gale L. Owens<br>Route 2, Box 2247-A<br>Hamilton, MT | 11,362.00 |
| 17. Solar System | Richard P. Sheridan<br>Botany Department<br>University of Montana<br>Missoula, MT | 8,000.00 |
| 18. Solar/Wind/Wood Home | Thomas W. Power<br>Bass Creek Commune<br>Route 2<br>Stevensville, MT | 12,095.96 |
| 19. Solar/Heat Pump | William B. Tomlinson<br>403 Colorado Avenue, N.W.<br>Great Falls, MT | 7,166.50 |

SOLAR PROJECTS FUNDED IN 1977 FIRST SUBMITTAL PERIOD

| | | |
|---|---|---|
| 20. Solar Heated Home | Phillip Pallister<br>Jaybird Ranch<br>Boulder, MT | 8,000.00 |
| 21. Solar Heated Home | Dennis Howard<br>River Road<br>Glendive, MT | 6,000.00 |
| 22. Solar Heated Home Retrofit | Orville Oien<br>C-E Ranch, Inc.<br>R.R. 3, Box 89<br>Conrad, MT | 7,276.00 |
| 23. Solar Home Heating | William Harbrecht<br>716 Broadway<br>Helena, MT | 10,000.00 |

| PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT AMOUNT |
|---|---|---|
| 24. Solar Home Heating | David Orndoff<br>1063 Breckenridge<br>Helena, MT | $5,000.00 |
| 25. Solar Home Heating | John MacDonald<br>Route 1, Box 53C<br>Stevensville, MT | 4,314.00 |
| 26. Solar Home Heating | George Mattson<br>109 East Main<br>Bozeman, MT | 8,000.00 |
| 27. Solar Mobile Home Heat | James Orvis<br>Route 1, Box 347<br>Bozeman, MT | 3,700.00 |
| 28. Solar Home Heating | D. E. Peterson<br>1 Carriage Way<br>Missoula, MT | 7,000.00 |
| 29. Solar Mobile Home Heat | Lawrence Truchot<br>Route 2, South, Box 937<br>Great Falls, MT | 7,500.00 |
| 30. Solar Home Heating | Jack Kreitinger<br>Route 1, Box 195<br>Three Forks, MT | 4,315.00 |
| 31. Solar/Wood Heat in Denny Driscoll Boys Home | Rev. J. F. Finnegan<br>P.O. Box 3093<br>Butte, MT | 30,000.00 |
| 32. Solar/Wood Home Heat | Anthony Terzo, Jr.<br>820 Hilda Avenue<br>Missoula, MT | 10,000.00 |
| 33. Solar/Wood Home Heat | John Duffield<br>Route 5, Pattee Canyon<br>Missoula, MT | 9,640.00 |
| 34. Solar/Wood Home Heat | Gregory Cuniff<br>724-33 B Avenue, N.E.<br>Great Falls, MT | 16,850.00 |
| 35. Solar/Wind/Wood Home Heat | Richard Dill<br>Route 2, Box 50A<br>Stevensville, MT | 6,361.00 |
| 36. Solar Shower and Domestic Hot Water | Montana Conference of the United Church of Christ Rocky Mountain College<br>Kimball Hall<br>1511 Poly Drive<br>Billings, MT | 1,300.00 |

| | PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT AMOUNT |
|---|---|---|---|
| 37. | Collector, Collector Fluid System Performance Testing | Tom Shelley<br>Montana College of Mineral Science and Techology<br>Butte, MT | $14,812.00 |
| 38. | Solar Mobile Home Heating in 20 Low Income Units | Dist. #11 Human Resources Council<br>297 East Main<br>Missoula, MT | 26,000.00 |
| 39. | Solar Domestic Hot Water for an 84 Apartment Unit | Horizon Lodge<br>Major Caldwell<br>701 South Wisconsin<br>Conrad, MT | 50,000.00 |
| 40. | Solar Home Heating for 20 Low Income Homes | Dist. #4 Human Resources Council<br>Box 1509<br>Havre, MT | 6,076.00 |
| 41. | Solar Domestic Hot Water Heating and a Solar Greenhouse | Butte-Silver Bow Antipoverty Council, Inc.<br>107 East Granite<br>Butte, MT | 4,148.00 |
| 42. | Solar Year Round Greenhouse | Peter Gobby<br>208 S. Wilson<br>Bozeman, MT | 12,000.00 |
| 43. | Solar/Wind Electric Heated Year Round Greenhouse | John Brown<br>Box 216<br>Circle, MT | 12,500.00 |
| 44. | Solar Greenhouse/Wood Home Heat | Gary Franklin<br>4428 Sixth Avenue South<br>Great Falls, MT | 5,000.00 |
| 45. | Solar Concentrating Collector Home Heating System | William Kilby<br>3813 5th Avenue North<br>Great Falls, MT | 14,100.00 |
| 46. | Development of Fluorescent Tube Solar Collector | Peter Antonioli<br>Box 791<br>Butte, MT | 5,000.00 |
| 47. | Develop and Test 5 Tracing Parabolic Solar Collectors | Ronald Breese<br>Box 221<br>Whitefish, MT | 5,000.00 |
| 48. | Develop Semicicular Hot Air Solar Collectors | Lowell Anderson<br>Our Redeemer's Lutheran Church<br>1311 University<br>Helena, MT | 4,000.00 |

| PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT AMOUNT |
|---|---|---|
| 49. Solar Electric Radio Signal Repeater | Lee Barrett<br>Electronics Research Lab<br>Montana State University<br>Bozeman, MT | $ 5,314.00 |
| 50. Study of Vertical Solar Collector Efficiencies | John Drumheller<br>Physics Department<br>Montana State University<br>Bozeman, MT | 12,990.00 |
| 51. Develop a Digitized Heat Control and Energy Monitoring System | Donald Weaver, Jr.<br>1820 South Seventh Avenue<br>Bozeman, MT | 6,000.00 |
| 52. New Western Energy Road Show | Kye Cochran<br>AERO<br>435 Stapleton Building<br>Billings, MT | 44,800.00 |
| 53. Six Active Solar Domestic Hot Water Preheating Systems | Dist. #11 Human Resources Council<br>Mike Barton<br>207 East Main<br>Missoula, MT | 15,000.00 |
| 54. Solar Heated Enclosed Swimming Pool | City of Shelby<br>Rae Kalbleisch<br>Box 518<br>Shelby, MT | 36,800.00 |
| 55. Unattached Greenhouse-Active Solar Heating System | James Orvis<br>Route 1, Box 347<br>Bozeman, MT | 616.00 |
| 56. Attached Greenhouse | Stan Steadman<br>320 East Power Street<br>Bozeman, MT | 1,240.00 |
| 57. Continue 20 Station Solar Insolation Monitoring Program W/10 New Stations To Be Added | Charles Fowlkes<br>1820 South Seventh Avenue<br>Bozeman, MT | 35,490.00 |
| 58. Provide an Incentive for a Solar Community Development. | Thomas Stewart<br>8945 Douglas Circle<br>Helena, MT | 3,000.00 |
| 59. Produce a Final Solar Heating Design for the New Belgrade School Building | Board of Trustees<br>School District #44<br>Belgrade Public Schools<br>Belgrade, MT | 1,500.00 |

| PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT AMOUNT |
|---|---|---|
| 60. Passive Solar Heated Homes | Peter Recterfertig<br>1030 Harvard Avenue<br>Billings, MT | $ 1,265.00 |
| 61. Active Solar Heated Home (Air System) | Max Leighty<br>2212 Bullard Street<br>Miles City, MT | 3,245.00 |
| 62. Active Solar Heated Home (Air System) | John Alexander<br>Box 426<br>Big Timber, MT | 10,531.00 |
| 63. Active Solar Heated Home | Norm Sulenes<br>2218 Fairview Place<br>Billings, MT | 10,760.00 |
| 64. Active Solar/Wood Heated Carpenters Shop (Air System) | Phillip Schmitz<br>Ronan, MT | 4,649.00 |
| 65. Active Solar Heated Bldg. (Liquid Concentrating Coll.) | Phil Morrow<br>Box 30214<br>Billings, MT | 12,500.00 |
| 66. Active Solar Heated Church (Liquid Trickle-Type Coll.) | Brian Wood<br>Box 153<br>Loma, MT | 9,380.00 |
| 67. Active Solar Heated Mobile Home Demonstration, Design Development & Instrumentation (Air System) | Charles Fowlkes<br>1820 South Seventh Avenue<br>Bozeman, MT | 25,000.00 |
| 68. Active Solar Heat Pump Office Area, Full Instrumentation and System Analysis (Liquid System) | Charles Herndon<br>Mineral Research Center<br>Montana Tech Alumni<br>Butte, MT | 13,570.00 |
| 69. Solar Heated Home (now used for office area), [illegible]able Energy Library and Information Center | AERO-West<br>700 Seventh Avenue North<br>Missoula, MT | 6,498.00 |
| 70. Active Solar Domestic Hot Water Preheater (Liquid System) | Barbara Clowers<br>700 Seventh Avenue North<br>Great Falls, MT | 2,800.00 |
| 71. Active Solar Domestic Hot Water Preheater, Full Instrumentation and System Analysis (Liquid System) | Pacific Power and Light<br>Box 250<br>Kalispell, MT | 3,000.00 |

| PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT MONEY |
|---|---|---|
| 72. Establish a Year Round Renewable Energy Demonstrating Center for the New Western Energy Show in Helena | Kye Cochran<br>AERO<br>435 Stapleton Building<br>Billings, MT | $24,800.00 |
| 73. Study Legal and Institutional Barriers to Renewable Energy | Richard Klinger<br>619 First Street<br>Helena, MT | 10,000.00 |

WOOD PROJECTS FUNDED BY SENATE BILL 86 in 1976

| | | |
|---|---|---|
| 1. Wood Heat and Storage | S. Richard Hagan<br>Montana State University<br>Bozeman, MT | 4,000.00 |
| 2. Wood Heat | Robert M. Zycheck<br>Route 1, Box 89A<br>Bozeman, MT | 1,000.00 |
| 3. Automatic High Efficiency Wood Stove | Bill Delp<br>Independent Power Developers, Inc.<br>Box 1467<br>Noxon, MT | 6,968.00 |
| 4. Monitor a Wood Fireplace Used for Supplementary Home Heating | Alvin Fiscus<br>Route 3, Box 60<br>Bozeman, MT | 600.00 |
| 5. Double Wood Stove Heating System | Leland Smith<br>2425 Chaparral Road<br>Helena, MT | 2,837.00 |

BIOMASS PROJECTS FUNDED BY SENATE BILL 86 IN 1976

| | | |
|---|---|---|
| 1. Biomass | John E. Robbins<br>Chemistry Department<br>Montana State University<br>Bozeman, MT | $19,480.00 |

HYDROELECTRIC & GEOTHERMAL PROJECTS FUNDED BY SENATE BILL 86 IN 1976 & 1977

| | | |
|---|---|---|
| 1. Geothermal | William M. Spilker<br>Box 244<br>Helena, MT | $15,000.00 |
| 2. Geothermally Heated Bank | Michael Grove<br>First National Bank<br>White Sulphur Springs, MT | 28,500.00 |
| 3. Geothermal Heat Survey for the Warm Spring & a Greenhouse | Karen Barclay<br>Montana Energy & MHD Research & Development Institute<br>Box 3809<br>Butte, MT | 9,000.00 |

| PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT MONEY |
|---|---|---|
| 4. Water-Air Heat Pump System Using a Geothermal Spring & a Greenhouse | Dave Herriman<br>Post Creek<br>St. Ignatius, MT | $ 4,000.00 |
| 5. Drill & Test a Well for Geothermal Potential | Mountainview Memorial Hospital<br>John Bartos<br>Box Q<br>White Sulphur Springs, MT | 2,000.00 |
| 1. Hydroelectric | Independent Power Developers<br>Bill Delp<br>Box 1467<br>Noxon, MT | 19,885.00 |
| 2. Low Head Hydroelectric System Development | Bill Delp<br>Independent Power Developers<br>Noxon, MT | 25,000.00 |
| 3. 12 kw Hydroelectric System Located 7 Miles S.W. of Superior, MT | Terry Savage<br>Box 26<br>Lolo, MT | 14,050.00 |
| **BIOMASS PROJECT FUNDED BY SENATE BILL 86 in 1977** | | |
| 1. Biomass Research | John Robbins, David Ward<br>Montana State University<br>Bozeman, MT | 56,549.00 |
| **WIND PROJECTS FUNDED BY SENATE BILL 86 IN 1976 & 1977** | | |
| 1. Paddlewheel-Type Windmill | Leroy Gustafson<br>Box 1168<br>Cut Bank, MT | 4,800.00 |
| 2. Wind Energy System | Drapes Engineering<br>202 Eklund Building<br>Great Falls, MT | 5,093.00 |
| 3. Wind Electric System | Independent Power Developers<br>Bill Delp<br>Box 1467<br>Noxon, MT | 64,256.00 |
| 4. Wind Energy/Synchronous Inverter | V. Hugo Schmidt<br>Physics Department<br>Montana State University<br>Bozeman, MT | 19,640.00 |

| PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT MONEY |
|---|---|---|
| 5. Continued Synchronous Inverter and Ducted Rotor Wind Generator Development | V. Hugo Schmidt<br>Physics Department<br>Montana State University<br>Bozeman, MT | $19,640.00 |
| 6. 2 kw Dunlite Home Wind Generation System | Drapes Engineering<br>202 Eklund Building<br>Great Falls, MT | 19,375.00 |
| 7. Monitor a Site for Wind Potential | Wayne Lersbak, Superintendent<br>School District #3-7-3B<br>Cascade, MT | 10,000.00 |
| 8. Small Scale Wind Generation System | Robert Leo<br>Electronics Research Lab<br>Montana State University<br>Bozeman, MT | 8,035.00 |
| 9. Small Scale Wind Generation System | John Kelly<br>Star Route #1<br>Libby, MT | 3,500.00 |
| 10. Wind Monitoring at Location Near Cascade | John Gordon<br>Cascade, MT | 2,000.00 |
| 11. Wind Monitoring at Two Locations | Fort Belknap Agency<br>R.R. 1, Box 70<br>Harlem, MT | 2,000.00 |
| 12. Homemade Wind Powered Air Compressor | Bill Stockton<br>Grass Range, MT | 1,385.00 |

MONITORING EQUIPMENT & RESEARCH GROUPS FUNDED BY SENATE BILL 86 IN 1976 & 1977

| | | |
|---|---|---|
| 1. Center for Innovation | MERDI<br>Dr. Jerry Plunkett<br>Box 3809<br>Butte, MT | 100,000.00 |
| 2. Develop an Energy Use & Design Course to Be Taught at MSU | John Charles, Robert Warrington<br>Montana State University<br>Bozeman, MT | 21,006.00 |
| 3. Develop a Digitized Heat Control & Energy Monitoring System | Donald Weaver, Jr<br>1820 South Seventh Avenue<br>Bozeman, MT | 6,000.00 |

| PROJECT CATEGORY | APPLICANT NAME AND ADDRESS | GRANT AMOUNT |
|---|---|---|
| 4. Study the Feasibility of an Underground Wood-heated Conference Center | John Badgely<br>Institute of the Rockies<br>622 Evans<br>Missoula, MT | $ 3,675.00 |
| 5. Purchase of an Infrared Scanner | John Charles<br>Dept. of Mechanical Engineering<br>Montana State University<br>Bozeman, MT | 12,000.00 |
| 6. Purchase an Energy Environment Simulator to be Used in a Statewide Energy Education Program | Office of Public Instruction<br>Ed Eschler<br>Capital Building<br>Helena, MT | 3,000.00 |

# APPENDIX

## NOTES TO TABLES AND DESCRIPTION OF DATA ELEMENTS

### TABLE

#### General

For all tables, individual items may not add to totals because of independent rounding.

NA indicates that the data is not available; p indicates preliminary data.

#### Electricity

2.1 Abbrieviations used for power plant owners are as follows:

BR - United States Bureau of Reclamation
CE - United States Army Corps of Engineers
FIP - United States Department of Interior, Flathead Irrigation Project
MDU - Montana-Dakota Utilities
MLP - Montana Light and Power
MPC - Montana Power Company
PPL - Pacific Power and Light
WWP - Washington Water Power

2.2 Electrical generation data represent only that power generated by public utilities and do not include self-generated industrial electrical power.

2.5 Average annual prices were calculated by dividing total revenues by total sales.

#### Coal

3.3 Average price was calculated by dividing gross value of production by total production for each county.

#### Natural Gas

All volumetric data presented in Chapter III are expressed using a pressure base of 14.73 pounds per square inch absolute (psia) at 60 degrees Farenheit (60°F). Conversions to this uniform pressure base were made by MEC, where necessary.

4.1 The American Gas Association defines proved reserves as the estimated quantity of natural gas and oil which analysis of geologic and engineering data demonstrate with reasonable certainty to be recoverable in the future from known oil and gas reservoirs under existing economic and operating conditions. Natural gas is classified

in two categories based on type of occurrence in reservoirs, as follows:

1. Non-Associated gas is defined as free natural gas not in contact with crude oil in the reservoir.

2. Associated-Dissolved gas is the combined volume of natural gas which occurs in crude oil reservoirs either as free gas (associated) or as gas in solution with the crude oil (dissolved).

Since 1973, only the recoverable portion of natural gas in underground storage has been reported.

4.2 Montana Oil and Gas Conservation Division production data is based on reports by gas producers. It excludes gas vented or flared and gas used in repressuring. It is equivalent in definition to the Bureau of Mines marketed production, except that some volumes of gas withdrawn from storage facilities in Montana may be included in the Oil and Gas Conservation Division data. Source documents for the production data use a pressure base of 15.025 psia at 60° F., which was converted to 14.73 psia at 60° F.

Montana Department of Revenue data is based on tax receipts received from industry. Average wellhead price is computed as the total value divided by the total volume of gas. Natural gas distributed is for the fiscal years ending June 30 of the year shown on Table 3.7. Source documents report data for natural gas at 15.025 psia at 60° F., which was converted to 14.73 psia at 60° F.

4.3 AGA data covers sales of natural gas by utilities only; it does not include sales directly from producer to end-user. For the United States direct sales make up a significant portion of total gas use, particularly in the industrial sector. For Montana, direct sales are not significant; hence, AGA "total sales" is close to the Bureau of Mines "total gas delivered." United States gas sales figures include a small amount of manufactured gas, about one percent of the total sales. At the national level, approximately one-third of the gas sales reported in the AGA "other" category are to municipalities and government authorities; the other two-thirds consists of use by electric utilities. Some electric utility use of gas is included in the industrial sector. Average heat content is highly variable, depending on elevation. Any natural gas data that has been converted to BTUs is therefore only a rough approximation.

4.4 Source documents used for this table report data at sales pressure base, rather than a uniform pressure. Conversion to 14.73 psia was accomplished as follows:

(A) Data for Montana-Dakota Utilities was adjusted to a uniform pressure base by Montana-Dakota Utilities;

TABLE

(B) Data for the Montana Power Company assumes a pressure base in the source document of 14.9 psia. This appears to be very close for the industrial sector, but may overstate residential/commercial sales by a few percent;

(C) Data for Great Falls Gas Company assumes a pressure base in the source document of 13.28 psia.

The "other" category for sales by Montana Power Company consists of sales of natural gas to government and municipal authorities for heating. Sales of natural gas to Canada are not included in "total sales." "Other" sales by Montana-Dakota Utilities (MDU) consists of natural gas used in MDU electric generating plants at Baker, Glendive, Sidney and Miles City.

"Other" sales by Great Falls Gas Company are sales of natural gas to Malmstrom Air Force Base.

"Other Utilities" include the following companies (listed in approximate descending order by volume of sales):

Cut Bank Gas Company (supplies gas to Cut Bank, Montana; about 80 percent of gas purchased from Montana Power Company).

Shelby Gas Association (supplies gas to Shelby, Montana; gas is purchased from Montana Power Company).

Consumers Gas Company (supplies gas to Ferdig, Oilmont, Sunburst and Sweetgrass, Montana; gas is purchased from Montana Power and Hardrock Oil Company through the Treasure State Pipeline Company).

Saco Municipal Gas Company (supplies gas to Saco, Montana).

4.5 Average prices were computed as annual total value divided by annual gas volume. Wellhead price corresponds to marketed production; retail price corresponds to total consumption.

4.6 "Gross withdrawal" is defined as marketed production, plus gas vented and flared, plus gas used for repressuring.

"Consumption" is defined as total gas delivered to consumers, plus extraction loss, plus lease and plant fuel, plus pipeline fuel. Total gas delivered is the sum of gas delivered to residential, commercial, industrial, electric utility, and other consumers. Industrial use includes refinery use of gas but excludes pipeline fuel. Electric utility use of gas is obtained from the Federal Power Commission. Other use conists primarily of deliveries to municipalities and public authorities for institutional heating, street lighting, etc. This sector was not reported until 1967; prior to that year, it was primarily contained within the industrial sector.

TABLE

4.8 The United States Bureau of Mines reports data for the import and export of natural gas for Montana, in a similar format to that of Table 3.8. However, the Bureau of Mines data do not appear to be accurate, based on information from the companies involved. Hence, the Bureau of Mines data for interstate flows of natural gas have not been reported in this document.

Crude Petroleum and Petroleum Products

5.1 See notes on 4.1.

5.3. Crude oil production figures compiled by the Montana Oil and Gas Conservation Division are also reported by the United States Bureau of Mines. Average wellhead prices were computed as total value of production divided by total volume produced.

5.5 Data originally reported by the Montana Oil and Gas Conservation Division have been revised, as indicated on Table 4.5, by the Montana Energy Office on the basis of further information received from individual refineries. The Oil and Gas Conservation Division data appear to have originally understated Canadian inputs and overstated Wyoming inputs to the Continental Oil refinery, for at least 1968 to 1975. Canadian inputs to the Big West Oil and Westco refineries were apparently not reported to the Oil and Gas Conservation Division. Revised data is only available for 1972 to 1975, but it is likely that significant Canadian inputs to these two refineries existed prior to 1972.

5.6 Motor fuel is defined as all gasoline covered by state motor fuel tax laws plus diesel fuel and LPG used in the propulsion of motor vehicles. Military use of motor fuel and all aviation fuel use are excluded in the Department of Transportation data. It is noted that highway use of fuels may be understated due to excessive refunds for nonnighway use of fuel.

5.7 The large discrepancy between the Montana Department of Revenue "gasoline manufactured" and the United States Bureau of Mines "production of gasoline" has not been explained at this time.

5-8 - 5.11 Distillate fuel oil includes diesel fuel for both on and off highway use. Due to secondary storage facilities, sales of petroleum products do not necessarily equal consumption of those products during the same time period.

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* Beginning October, 1977, the new designation is United States Department of Energy, Energy Information Administration, Energy Information Reports.